ARCHIVES OF OPHTHALMOLOGY.

LISTING'S LAW. WHAT DOES IT MEAN AND WHAT IS ITS PRACTICAL VALUE IN DIAGNOSIS?

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(With three figures in the text.)

LISTING'S law, although enunciated forty years ago and accepted as true by all observers since, has been quite variously interpreted by different, equally good authorities.[1] Moreover, its practical value in diagnosis has been a matter of some question. It may not be unprofitable, therefore, to inquire:

1. What does Listing's law actually teach as regards wheel-rotation of the eye?

2. Whatever it teaches, has the law any practical value in the diagnosis of muscular paralysis?

WHAT DOES LISTING'S LAW MEAN?

Listing's law states what happens to the vertical meridian of the cornea (or retina) when the eye passes from one position to another. It is thus enunciated by Helmholtz:

[1] Thus the interpretation of the law given in this paper is in accordance with the statements of Donders, the two Graefes, Mauthner, LeConte, and most clinical observers, as well as with what seems to be the obvious deductions from anatomy. A precisely opposite interpretation is adopted by Helmholtz, Hering, and others. Embracing the views of the authorities last named, Dr. Eaton, in the course of a very appreciative and generous review of my "Motor Anomalies of the Eye" (in the *Ophthal. Record*, August, 1897), says that according to this law my explanation of the wheel-rotation of the eye in the various oblique positions is incorrect, and that, furthermore, this inaccuracy vitiates to some extent the deductions put forth in regard to the diagnosis of muscular paralysis. I believe that both of these criticisms are invalid, and that sufficient reasons for this belief are contained in the following pages.

When the line of sight*[1] *passes from the primary position to any other position, the wheel-rotation of the eyeball in this second position is the same as if the eyeball had been rotated about a fixed axis, perpendicular to both the first and the second directions of the line of sight.

"Simple as this law is," says Mauthner, "and simple as it sounds, there is certainly no one that ever understood it at the first hearing." With this warning in our mind let us picture to ourselves anew precisely what Listing's law does mean. For this purpose let us take Fig. 1, in which O is

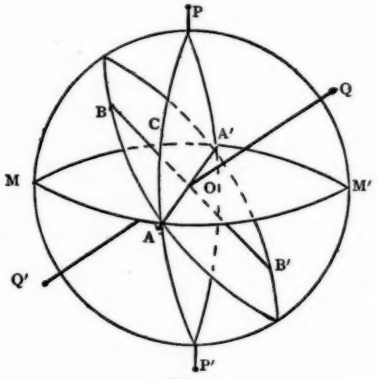

FIG. I.

the centre of rotation of the eyeball, OA the line of sight when the eye is in the primary position, and OB the line of sight when the eye is in a secondary position B. The circle APA′P′ will represent that meridian of the eyeball (meridian of the cornea and retina) which is vertical when the eye is in the primary position. Call this the *prime corneal* (or *retinal*) *meridian*, and its plane the *prime meridian plane*. Then

[1] Following LeConte, I have used the term "line of sight" as the equivalent of "Blicklinie." "Line of fixation" would perhaps be more accurate, but to English ears it conveys an extraneous idea derived from our common use of the word "to fix." Our verb "to sight" really corresponds accurately to the German "fixiren" or "blicken" (as used by Helmholtz), and the term "sighting-line," or the less clumsy although not quite as accurate "line of sight," is for English readers more expressive of what is meant by "Blicklinie" than "line of fixation" would be. So, too, "point of fixation" and "object fixed" are better rendered by "point sighted" (or "sighting-point") and "object sighted."

Listing's law asserts that this prime corneal meridian and plane will, when the eye passes into the secondary position B, be tilted precisely as they would if the eye had got to B by rotating round the fixed axis QQ′, perpendicular to OA and OB. Moreover, as Donders showed, and as all observers since have also found,[1] the prime corneal meridian will be tilted in the same way, no matter how the eye gets from position A to position B; *i. e.*, the wheel-rotation is the same, no matter whether the eye moves first out and then up, or first up and then out, or by a zig-zag movement up and out at the same time.

Now, applying this law to a concrete example, let us ask what, *according to it*, will happen to the corneal (and retinal) prime meridian when both eyes are directed up and to the right. We shall be surprised to find what different answers are given to this question.

Thus Donders, reasoning from experiment, declares that the prime meridian would, under these circumstances, be rotated to the right.

Helmholtz, basing his statements upon experiment and upon Listing's law, says that it would be tilted to the left.

Mauthner, who also professes to rely upon Listing's law, says that it would be tilted to the right.

LeConte, both upon the basis of Listing's law and of experiment, directly controverts Helmholtz, and says that the prime meridian would be tilted to the right.

Other minor discrepancies are encountered, *e. g.*, as to whether a torsion (in the sense of a rotation of the eye about its antero-posterior axis) ever occurs or not.

Now, some may maintain that these contradictions are only apparent, and that whether the prime meridian is tilted to the right or to the left, depends, so to say, upon the point of view of the spectator, *i. e.*, upon the way in which this meridian is projected. This is very possibly true, but it does not affect the practical question, which is, *How will the prime meridian be tilted with reference to a vertical object looked at, or with reference to the image of this object formed upon the retina?*

[1] Helmholtz.

To make clear what is meant by this relation, suppose (Fig. 2) that the eye is in the primary position with its line of sight passing through A, and is sighting or "fixing" a vertical line directly in front of it. Such a line will lie in the plane of the corneo-retinal prime meridian AP, and the retinal image of the line, being also vertical, will be parallel to this plane.

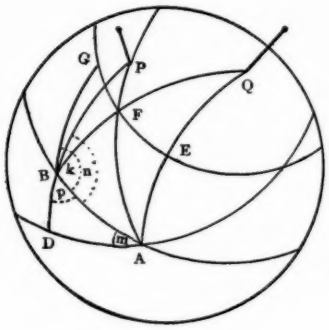

FIG. 2.

Suppose now that the eye swings horizontally to the right, so that the line of sight passes through D, and the eye once more finds a vertical line directly in front of it, *i. e.*, in the prolongation of the line of sight. Then, according to all observers and all interpretations of Listing's law, the corneo-retinal prime meridian will still be vertical, *i. e.*, will coincide with the meridian PD. Hence the vertical line sighted (which necessarily lies in the plane of the meridian PD) must, as in the previous instance, lie in the plane of the corneo-retinal prime meridian; and the (vertical) retinal image of the line must as before be parallel with this plane.

Lastly, suppose the eye, after having been thus swung to the right, to be raised until the line of sight passes through B. The vertical line directly opposite the eye will still form a vertical image upon the retina, so that not only will the line itself still lie in the plane of PD, but its retinal image will also still be parallel to this plane. But will the corneo-

retinal prime meridian still be parallel with this line and with its retinal image, *i. e.*, will it still coincide with PD as it did when the line of sight was horizontal? If not, *will it become tilted to the right or the left* of PD as the eye rises?

To answer this question, let us refer again to Fig. 1. The axis QQ′ which necessarily passes through the centre of rotation O, is perpendicular to the diameters AA′ and BB′ at O. Hence the distance, measured along the surface of the sphere, from Q to A and from Q to B is 90°. Consequently if, as Listing's law asserts, A gets to B by rotating about QQ′ as an axis, *it must do so by moving along the arc of a great circle* AB of which Q is the pole.[1]

Reverting now to Fig. 2, draw the meridians QA and QB, and through the point F where QB intersects PA draw a small circle EFG parallel to AB and intersecting QA in E. Lay off FG = EF, and connect B with G by the great circle BG. If we liken the eye under these conditions to a terrestrial globe, Q would be one of the poles around which the globe revolves and AB would be the equator. EFG would be a circle of latitude, and in the rotation of the globe about the axis QQ′ a point F on such a circle will travel over a distance equal to EF, while a point A on the equator is travelling over the distance AB. Hence as FG = EF, the point F will as it revolves around QQ′ move to G, while the point A is moving to B. Consequently the prime meridian AF, if it follows Listing's law, will at the end of its rotation have the position BG.

Since, as already shown, AB is the arc of a great circle, the figures BAD, QAB, and PBA are spherical triangles. In these triangles denote the angle BAD by *m*, ABD by *p*, and PBA by *n*. Also denote the angle GBA by *k*. Then

$$n = 180° - p \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

and

$$k = 90° + \text{angle GBQ} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

[1] Listing's law might, therefore, be enunciated in this form:
When the eyeball is in any secondary position, it always has the same wheel-rotation, i. e., the same deflection of its prime corneal meridian from the vertical, that it would get by having the corneal end of the line of sight travel from the primary to the secondary position directly, i. e., along the arc of a great circle.

Now the figures GBF and EAF are equal,[1] hence

Angle GBQ = angle QAP = 90° − PAB = m..(3).

Hence

$$k = 90° + m \quad \ldots\ldots (4)$$

Subtracting (1) from (4) we have

$$k - n = m + p - 90° \quad \ldots\ldots (5)$$

But, as the angle BDA = 90° and as the sum of the angles of a spherical triangle is always greater than 180°,

$$m + p > 90° \quad \ldots\ldots (6)$$

Hence

$$k > n \quad \ldots\ldots (7)$$

i. e., BG lies to the right of PD. In other words, *the corneo-retinal prime meridian, which coincides with PD when the line of sight passes through D, becomes tilted to the right of PD as soon as the line of sight rises to B. And it is tilted to the right, not only as compared with the vertical meridian PD, but also as compared with a vertical line which the eye is sighting at the time, and as compared with the (vertical) image of such a line upon the retina* (see ante p. 500).

In a similar way Listing's law may be applied to determine the position of the corneo-retinal prime meridian in the other oblique positions of the gaze (up and left, down and left, and down and right). The results will be concordant with the above and may be stated thus[2]:

When the gaze is directed up and to the right or down and to the left, the corneo-retinal prime meridians of the two eyes are tilted to the right; when the gaze is directed up and to the left or down and to the right, the corneo-retinal prime meridians are tilted to the left.

Or, to use the more technical language adopted by Helmholtz, in which movements up, movements to the right, and right-handed wheel-rotations are all called +, while the contrary movements and rotations are called −, we may say with Mauthner:

[1] For EA and BF, being meridian-arcs included between the same parallels of latitude, are equal; EF = FG; and BGF = AEF = 90°; hence the two figures, having three of their homologous parts equal, are equal in all their parts. Or, the same thing may be shown by rotating the figure EAF about QQ′ until A reaches B, when it will be found that the two figures coincide in all their parts.

[2] Mauthner.

When the lateral and the vertical movements performed by the line of sight in arriving at any secondary position are of the same sign, the wheel-rotation in such secondary position is positive; when they are of opposite signs, the wheel-rotation is negative.[1]

This statement, it will be observed, is the direct converse of that contained in Helmholtz's *Physiological Optics.*

It may be added that these relations above enunciated may be *readily demonstrated on a terrestrial globe* which is so mounted as to admit of rotation on an oblique axis, *i. e.*, one not passing through the north and south poles. To reproduce the conditions of Listing's law, this axis must lie in a plane at right angles to the prime meridian (*i. e.*, in the plane of the meridian that is situated 90° east and west o Greenwich). For rotations about any such axis it will be found that the meridian of Greenwich on the globe (corresponding to what I have called the corneo-retinal prime meridian in the eye) will be tilted to the right or to the left of the true vertical in precise accordance with the statements above enunciated.

EVIDENCE FROM PHYSIOLOGY.—Although it is beside my purpose to discuss this question in its physiological aspect, I may say in passing that, just as authorities differ in their interpretation of Listing's law, so also they differ as to the inferences (with regard to the position of the corneal prime meridian) to be drawn from the study of the after-images. Donders from a study of this sort came to a conclusion identical with that here presented. Helmholtz,[2] observing the same phenomena, drew from them directly opposite inferences. Here again, therefore, it is a question not of the facts, but simply of the interpretation to be put upon the facts; and LeConte[3] has given convincing reasons for regarding Helmholtz's interpretation as invalid.

[1] This is a very free rendering, although it expresses the precise sense of Mauthner's statement. His actual words are:

"Haben Seitenwendungs-und Erhebungswinkel das gleiche Vorzeichen, so ist der Raddrehungswinkel positiv. Haben Seitenwendungs-und Erhebungswinkel das entgegengesetzte Vorzeichen. so ist der Raddrehungswinkel negativ." (*Augenmuskellähmungen*, pp. 516, 517.)

This is Helmholtz's enunciation (*Physiol. Optik*, 2d ed., p. 620) with the substitution of positive for negative, and vice versa.

[2] *Physiol. Optik*, 2d ed., pp. 621 *et seq.*

[3] *Sight*, part iii., ch. i.

IS LISTING'S LAW OF VALUE IN THE DIAGNOSIS OF MUSCULAR PARALYSIS?

We have seen that there are two diametrically opposite interpretations of Listing's law. And we may now ask: What difference, after all, will our adoption of one interpretation or the other make in our conception of the behavior of the double images in paralysis? The following considerations will serve to elucidate this question.

Suppose that the eyes are directed at a vertical line situated 30° to the left. Under these conditions (Fig. 3, I) the prime meridians (MN, M′N′) of the two retinæ will be vertical and will hence be parallel with the retinal images of the line (BA, B′A′); and the line itself will appear vertical. Now suppose that the eyes are raised 30°. The line will still appear vertical and its retinal images will be vertical. The same will be the case if the eyes are depressed 30° below the horizontal plane. But in the former case, if we adopt the explanation of Donders, the retinal prime meridians (MN, M′N′) will be tilted to the left (Fig. 3, II), and in the latter case to the right (Fig. 3, III) of the retinal images. And if we adopt Helmholtz's explanation, the retinal prime meridians will be tilted to the right in the former case (Fig. 3, III) and to the left in the latter (Fig. 3, II). Hence on either hypothesis the relation of the retinal image of the vertical line to the retinal prime meridian differs in the upper and lower fields and indeed is constantly changing. That, nevertheless, the line looked at appears vertical in all directions of the gaze shows that our notions as to the verticality of a line are not dependent upon the fact that it coincides with the plane of the corneo-retinal prime meridian or indeed bears any fixed relation to the latter. The prime meridians, in fact, may be tilted in any way whatever or be vertical, but, however they are disposed, so long as they present the relations that experience has taught us to regard as normal, a vertical line looked at will appear vertical. *It is only when these normal relations are disturbed that a vertical line will cease to look vertical;* and then its apparent deflection from the vertical will depend solely upon the kind and amount of the disturbance, and not

upon what the conditions were that existed before the disturbance was set up. Hence in a diagnosis based upon the double images we have only to reckon with the morbid

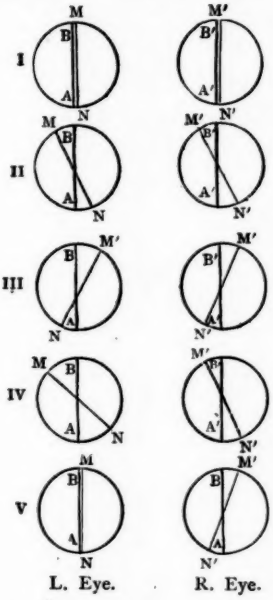

FIG. 3.—VIEW OF RETINA OF THE RIGHT AND LEFT EYES SEEN FROM BEHIND, SHOWING VARYING RELATIONS OF RETINAL IMAGES AND RETINAL PRIME MERIDIANS IN DIFFERENT POSITIONS OF THE GAZE.

BA, *B'A'*, images of a vertical line upon the retina. *MN*, *M'N'*, retinal prime meridians of right and left eyes. I shows relation of retinal images and retinal prime meridians when eyes are directed horizontally to the left. II shows the relation that, according to Donders, exists when the eyes are directed up and to the left, or that, according to Helmholtz, exists when they are directed down and to the left. III shows relation existing when eyes are directed down and to the left (Donders), or up and to the left (Helmholtz). In all the foregoing cases the two retinal prime meridians, however directed, are parallel. IV, V show relations existing in paralysis of the left superior oblique when the eyes are directed down and to the left. The retinal meridians diverge. IV represents the actual arrangement of the retinal meridians according to Helmholtz. V, according to Donders. In both arrangements, the left prime meridian (*MN*) is deflected by an equal amount to the left of its normal position, and the degree of divergence of *MN* from *M'N'* is equal.

alterations of the positions of the retinal prime meridians and need not concern ourselves with what this position was before being altered.

To illustrate by a concrete example. If (Fig. 3) we look down and to the left directly at a vertical line, that line forms vertical images (BA, B′A′) upon the two retinæ; the retinal prime meridians (MN, M′N′), whether their actual position is represented by II or III, are parallel; and the line itself will appear to us vertical. Suppose now that the left superior oblique is paralyzed. The left prime meridian, owing to this paralysis of one of its right-handed wheel-rotators, is tilted to the left of its normal position, and the prime meridians of the two eyes, consequently, instead of being parallel, diverge; and diverge by an equal amount whichever interpretation of Listing's law we adopt (Fig. 3, IV and V). The result, according to the well-known law of projection is that now two images of the line are seen, with the upper end of the left image converging towards that of the right. *The amount of this convergence of the double images will obviously depend solely upon the amount of divergence of the retinal prime meridians*, and it will be the same whether we regard IV or V as expressing the actual arrangement of the prime meridians in the case of paralysis; *i.e.*, whether we regard II or III as the arrangement under normal conditions. In fact, it does not matter whether the prime meridians were originally both vertical, or both tilted to the right (as Donders says), or both tilted to the left (as Helmholtz says), so long as their position, whatever it was, was the one that in experience had been associated with normal conditions and consequently with normal ideas with respect to the attitude of objects looked at. When this was the case the line looked at appeared vertical. Again it matters not whether the new position of the left prime meridian, due to the paralysis, is actually vertical, or is tilted to the right, or is tilted to the left, *so long as it is to the left of its normal position.* In this case the image of a vertical line formed by this eye will always look tilted to the right.

Hence *the paralysis of a superior oblique will produce the same definite disturbance of wheel-rotation and the same sort*

of tilting of the double images, whatever interpretation we put upon Listing's law, or even if we reject the law altogether.

Once more. Even if Listing's law did have a bearing upon the way in which the double images are tilted in paralysis (and what has been said shows that it does not), it must be remembered that our diagnosis of paralysis is never dependent upon the presence or absence of such tilting. It is made rather upon the presence or absence of a vertical or lateral diplopia increasing in a certain direction of the gaze. With such a diplopia Listing's law has nothing to do.

The answer to our second question, therefore, is:

Listing's law has no significance whatever in the diagnosis of muscular paralysis.

NEW OPHTHALMIC OPERATING TABLE.

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(*With one figure in the text.*)

THIS table was devised by the author to overcome the many difficulties to which ophthalmic surgeons are subjected when operating on ordinary tables now in use.

A semicircle is cut out of the glass top, and a curve is made in the frame on the left side, which enables the opera-

tor to stand more directly in front of the patient's face. By this simple device one may more dexterously operate on the right or left eye with either hand, and its advantages are still better shown when performing plastic operations on either side of the face. The head-rest is raised or lowered

with a ratchet to give better position to the head in operating for cataract or squint.

The clamps *AA*, which are slightly curved and press against the side of the head, holding it firmly in place, were suggested by Prof. Laplace. A small leaflet accompanies the table, which may be attached to either side, and is used for the instrument tray.

I am indebted to E. A. Yarnell & Co., 1020 Walnut Street, Philadelphia, for carrying out my design.

THE CLINICAL SIGNIFICANCE OF BI-TEMPORAL DEFECTS OF THE VISUAL FIELD.

By Dr. G. ABELSDORFF, Berlin.

Translated by Dr. J. A. Spalding, Portland, Me.

(*With twelve figures on Plates III. to VIII. of Vol. XXXI., German Edition.*)

IF the conduction of all of the fibres of the optic nerve which cross at the chiasma is totally cut off by pressure acting upon the middle portion of that region, the affection reveals itself clinically by the loss of the temporal halves of both visual fields. If from this undeniable fact we were to draw the conclusion that the loss of the temporal halves of the visual field is invariably to be referred to an affection of the chiasma, we call into service a very useful, but logically untenable conclusion, in that we are led to believe that we can at pleasure exchange the major and minor premises of our argument. The chiasma, despite the dangerous situation in which it lies, owing to which it can be sympathetically affected by so many neighboring parts, is, in point of fact, but rarely affected. It is also, *a priori*, clear that temporal hemianopsia especially, a disease limited to the fasciculi cruciati, can never be observed as often as homonymous hemianopsia, because the cause of the latter may arise from a more extensive region—the *tract* itself, as well as in its farther central course, provided that the injury is limited to one side. For this reason, then, the number of published cases of homonymous hemianopsia far exceeds that of temporal hemianopsia. Moreover, the number of the latter is actually smaller than appears at first sight, because the erroneous conclusion mentioned above is not, as it should be, invariably

avoided by the observer in question, so that the absence of both temporal fields in diseases of the optic nerve itself is regarded and entitled temporal hemianopsia. If, however, we cling to the usual terminology and count as hemianopsia only such symptomatic defects of the visual field as are produced by a single central focus, the mere absence of the temporal halves of the field does not suffice for the diagnosis of temporal hemianopsia, which is only actually assured by a knowledge of the course of the disease and associated symptoms pointing to an undeniable central affection. As it now almost invariably happens that a prolonged period of observation is hindered by the patients passing from view, I beg leave to offer here the history of two women with bi-temporal defects in both visual fields, several years after they had been carefully examined at the University Clinic in Berlin.

CASE I.—Lina, aged forty-three, unmarried, is of a healthy family, and has no recollection of serious disease during youth, but at about fourteen the left leg began to get weak, so that she would fall to the ground, and have to lie abed for a few days to recover strength to walk. At about the same time the fingers of the left hand began to swell, together with the left tibia, which gradually increased in size, but without pain. The menses came on at sixteen and remained regular till the patient was twenty-eight, when they suddenly ceased, and soon after the swellings on the fingers showed rapid growth, the fourth finger on the left hand being amputated to prevent the disease extending into the palmar region. From that time on to the age of thirty-nine, the patient's health was good, but then she began to suffer from headache and loss of sight.

The examination at the clinic in January, 1895, showed normal conditions of the body, including mobility and sensibility, except the enchondromata on the three fingers of the left hand and on the left tibia, as the tumors were called by Langenbeck, who wrote to me at my request about the operation on the finger.

The sense of smell is so much reduced that only strong odors like that of chlorine water are perceived. The right antrum of Highmore contains much pus, which has apparently existed for a long time, as the patient admits having perceived for years a purulent outflow from one nostril. But this peripheral affection offers

no satisfactory explanation for the loss of the sense of smell, so that the cause must be sought for in the olfactory nerve or farther in the nerve centres.

The vision in 1891 was, as we found from the note-books, O D $\frac{6}{12}$ and O S $\frac{6}{18}$. The left eye showed a defect in the field occupying the outer-upper half in the form of a scotoma, through which objects could only be seen indistinctly. In the right eye the field was good (Figs. 1 and 2). Colors were well seen with both eyes. Normal ophthalmoscopic image in both eyes, O D H + 2 D S, O S H + 1 D S.

The sight gradually decreased during the following months, and the patient suffered repeatedly from pain in the head and nausea. The vision in September, 1892, was $\frac{6}{240}$ O D and $\frac{6}{60}$ O S. Total defect of the temporal halves in both eyes, with simultaneous contraction of the nasal half in the eye having the poorer vision (O S), as shown in Figs. 3 and 4.

I saw the patient in 1894 and found vision O D with + 1 D S $\frac{6}{30}$, O S with same lens, $\frac{6}{24}$. As the vision had improved, so the field for white had widened quite noticeably. The general condition of the fields is shown in Figs. 5 and 6. The movements of the eyes are normal in all directions, the pupils react promptly, and the ophthalmoscopic picture is normal.

From this time on, the patient improved rapidly, and, in 1895, the vision with + 2 D S was O D $\frac{6}{10}$ and O S $\frac{6}{20}$, and reading was not difficult for ordinary type.

Figs. 7 and 8 show the general condition of the fields. The left eye shows a dividing line of the visual field in the temporal halves; the previous defect in the lower portion extending to the nasal half is no longer present, but at this spot the field passes farther to the temporal side as a triangular zone of misty vision in which colors are not perceived. The fixation point, from the division line, is halved for white as for colors.

The right eye, with nearly normal vision, shows restitution of the field over the central portion, but the temporal halves of both eyes still show loss of perception for colors.

Case 2.—Martha, aged twenty-six, was, with the exception of the measles, healthy in childhood, until at the age of twenty-two, the menses which had before been regularly established suddenly ceased. The patient now suffered severely with headache and later with loss of vision, for which she attended the University Eye Clinic in Berlin, where I find noted for October, 1892, O D

$\frac{6}{20}$ and 0.75 type, at 20 *cm* O S. $\frac{6}{20}$ and the same type. Both papillæ very pale, and retrobulbar neuritis diagnosticated.

The patient used diaphoretics at home and did not return until 1894, when we discovered O D $\frac{1}{8}$, O S $\frac{1}{16}$. Movements of the eyes were normal, pupils reacting freely, and an ophthalmoscopic picture of optic atrophy in both eyes. The vessels show no alterations, but the left lamina cribrosa is very distinct.

The visual fields are shown in Figs. 9 and 10.

On examining the field with a piece of white paper 1 *cm* square, we find in each eye (Figs. 9 and 10) a total defect of the temporal halves, whilst in the left eye the nasal half also is no longer intact. But whilst in this eye colors are still recognized, and the visual field for these coincides with that for white, there is in the right eye an actual scotoma for red, within which red is called yellow.

Examination of the other organs of the body revealed nothing abnormal; but, owing to the pronounced amennorrhœa, the patient was referred to the gynæcological clinic, where retroflexion and hyperplasia of the uterus were found.

Much as the visual fields in both patients resemble one another at a particular stage of the disease, yet their entire clinical course was different and antagonistic. *In the first case* the disease began with pain in the head, vertigo, and nausea, with that farther cerebral symptom of excessive diminution of the sense of smell. The disturbance of vision began with a temporal defect in the visual field of both eyes; later, we had total loss of the temporal visual fields, the ophthalmoscopic appearances remaining, in the meanwhile, perfectly normal till, finally, improvement ensued in that the vision of the left eye increased from $\frac{1}{8}$ to $\frac{1}{4}$, whilst that of the right eye became nearly normal. In this case, also, the temporal half of the field was mostly restored, although the perception of colors in that district was not.

At present, therefore, there exists only a temporal hemianopsia for the perception of colors, and we have the diagnosis of a basilar focus of disease which chiefly affects the middle portion of the chiasma, but in front has extended so far that it has additionally affected the optic nerve. This is probably the truth of the matter, whilst the course of the disease proves that the morbid focus may be regarded as

relatively benign. If we, therefore, diagnosticate a benign tumor as the cause of the pressure on the chiasma and nerves, the visible predisposition of the rest of the body toward the formation of enchondromata would lead us to favor the presence of such a sort of tumor at the base of the skull. The mere fact that it was not until late in life that the enchondroma excited ocular symptoms can be explained by reference to many other observations according to which, enchondromata arising in childhood are at more advanced years accompanied with other new ones in other portions of the body, or those already present show renewed growth.[1] Similar remarkable improvement in vision has been repeatedly observed in chiasmal diseases which were produced by tumors, and in which the correctness of the diagnosis was confirmed by the autopsy.[2]

Now, on the contrary, *the second case* offered nothing in support of the diagnosis of a central focus of disease. A woman of twenty-six, with pallid optic papillæ and loss of sight three months before, shows together with greatly reduced vision and well pronounced optic atrophy a defect of the temporal halves of the visual field. Of course, the mere notice in the books of a retro-bulbar neuritis is no proof, but that that evidently was a case of atrophy due to chronic inflammatory conditions, is shown by the central scotoma for red and green in the left eye, and the opacity in the lamina cribrosa of the right.

It is also well worth observing that the patient suffered from amennorrhœa which appeared a short time before the diminution of vision. Of course a single case of *post hoc, ergo propter hoc*, amounts to nothing, but the coincidence of two rare affections is here remarkable enough to deserve consideration, since the coincidence in optic-nerve diseases without the apparent ætiology has been repeatedly observed by Leber,[3] and also by Foerster.[4] Simple as it seems to regard

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[1] Weber, "Zur Geschichte des Enchondroms." *Virchow's Archiv*, xxxv., p. 501.

[2] Saemisch, *K. M. f. A.*, 1865, p. 51, and E. Muller, *v. Graefe's Archiv*, viii., 1, p. 160.

[3] *Graefe-Saemisch*, Band v., p. 817.

[4] *Graefe-Saemisch*, vii., p. 100.

both diseases as the expression of a common constitutional cause, the knowledge of the actual cause would not be furthered by this explanation, and the connection between the two is probably best explained by accepting Foerster's idea, that with early atrophy of the uterus at a time when the menses ought to establish themselves, fluxions occur toward various parts of the body, and that in this way an "insufficient menstruation, due to atrophy of the uterus, simultaneously exciting fluxions to the retina and optic nerve, forms the starting-point of the optic-nerve atrophy."

It cannot be denied that in the second patient the eye disease can also be explained by an affection of the chiasma. But if we grant that the nerve bundles of the optic nerve have a tendency to become sympathetically affected, there is no foundation for the forced idea of a central lesion assumed simply to favor this scheme.

It is easy to prove by plenty of clinical witnesses, that often enough in genuine optic atrophy, so long as it is not yet total, symmetrical bundles are at first affected, since in that form of progressive optic-nerve atrophy which is not probably of cerebral origin, defects simulating the hemianopic appearances associated with tabes dorsalis have been observed and actually entitled as such.[1] Furthermore, a case by Schoeler and Uhthoff[2] illustrates how both lower halves of the visual field can fail without actually deserving the name of hemianopsia inferior. Later in this case the symptoms of tabes appear.

As a third illustration, I will cite the following case from my own personal knowledge:

Mrs. Clara R. æt. thirty-three, was seen in 1895; vision with + 2 D S O D $\frac{1}{6}$ and with same lens O S $\frac{1}{20}$. The right eye recognizes red only, the left eye blue only. Examination of the field shows that the temporal half of the left eye is lost, and only a small part of the same in the right eye is preserved (compare Figures 11 and 12.) The ophthalmoscope reveals optic atrophy. The patient exhibited many of the symptoms of tabes, such as Romberg's symptom,

[1] Lang and Beevor, "Bi-nasal Hemianopsia in a Case of Tabes." *Transac. Ophthal. Soc. U. K.*, xiv., p. 246.
[2] *Beitraege zur Pathologie des Sehnerves*, Berlin, 1884, p. 15.

absence of the patellar reflex, feeling of cold in the feet, analgesia of the legs, and incontinence of urine. Subsequent investigation showed that tabes had been diagnosticated five years before and that optic atrophy was also present.

All instances of symmetrical defects in the visual field in spinal optic atrophy show that the disposition to symmetrical disease is inherent in the nerve bundles of the nerve itself. Wilbrand's experiments to demonstrate, anatomically, by the arrangement of the nerve-fibre bundles the undeniable tendency to similar affections of the visual field in each eye in the most varying forms of optic-nerve disease[1] miscarried owing to the varying situation of the visual-field defects. In recognition of the fact that in a certain developmental stage of the optic-nerve atrophy the disease often reminds us deceivingly of temporal hemianopsia, he should like to explain the symmetrical affection in this way, that in the fasciculus cruciatus, which carries the vast majority of the optic-nerve fibres, the atrophy had advanced to the chiasma, and that beneath the pressure of the shrivelling nerve fibres, there crossing and intertwining closely together, the function of the still normal bundles of nerves in the central portion of the chiasma was soon destroyed, until finally the fibres of the lateral bundles were totally involved in the same process.[2] Inasmuch as the before mentioned cases offer examples of the absence of the nasal as well as of the lower visual fields in progressive optic-nerve atrophy, Wilbrand's anatomical explanation is, to say the least, insufficient, and we must be satisfied with the more functional explanation of the *disposition* of the optic nerve to symmetrical affections of its various bundles.

[1] *v. Graefe's Archiv*, xxii., 3, p. 321.
[2] Wilbrand, *Ueber Hemianopsia und ihr Verhalten zur typischen Diagnostik der Gehirnkrankheiten*, 1881, p. 40.

THE UTILITY OF THE X RAYS IN DETECTING AND LOCATING METALLIC PARTICLES IN THE EYE.[1]

By A. B. KIBBE, M. D., Seattle, Washington.

(*With one figure in the text.*)

WITH the means ordinarily at his disposal, it is seldom that the ophthalmic surgeon is unable to satisfy himself of the presence or absence of a foreign body of metallic nature in the eye, should the case-history be at all suspicious. When seen soon after the receipt of the injury, before symptoms of irritation have occurred, the nature and location of the wound, if the body cannot be seen by direct inspection, either by the unaided eye or with the ophthalmoscope, are often alone sufficient to enable him to give a positive opinion, but cases present themselves now and then in which no decision can be rendered, though it may be of vital importance for the safety of the eye, if it contain a foreign body, that operative measures be immediately adopted.

To wait for the onset of inflammatory symptoms—iritis, irido-cyclitis, etc., though they usually give us positive indications—is simply to wait for an excuse as it were to enucleate the eye. To introduce an electro-magnet in a blind attempt to find what may not be present is fraught with too much danger to be resorted to in most cases, and we are therefore too often forced to stand idly by and adopt the most exasperating of all methods of treatment, the expectant plan.

From the ease with which metallic bodies are detected in

[1] Read before the Oregon State Medical Society June 7, 1897.

many portions of the body by aid of the Roentgen rays we might infer that the eye should not be an exception to the general rule, and that metal lodged within it should be quite as readily recognized as elsewhere, but surrounded as it is with dense bone the difficulties are comparatively great.

In order to satisfy myself as to what value, if any, the rays possessed in this particular direction, a series of experiments was begun in August of last year on patients in whose eyes the presence of metal was either known or suspected. The cases are in brief as follows:

CASE I.—J. W.—Injured eight months prior to consulting me. Cicatrix on upper lid near edge of orbit; eyeball shrunken and tender to touch. No vision. History of repeated attacks of sympathetic irritation. Examination made at this time with the fluoroscope showed what I was convinced was a large piece of metal. The eye was enucleated the following day, and that evening examined unopened by holding it before the fluoroscope. The particle appeared to be floating in air so sharply was it outlined. On opening the eye, a particle of steel was found nearly filling the atrophied globe. I made only a skiagraph of the globe wrapped in cotton and placed in the orbit of a skull. I have always regretted not having taken a skiagraph of this case, as the large piece of metal would have shown very plainly on the plate.

CASE II.—A.A.—Injured three days prior to visit by chip flying from a wedge. Faint linear scar on cornea just below its centre. Traumatic cataract—iritis. Fluoroscopic examination shows what appears to be a faint image of a piece of metal. On the following morning, a very small scale of steel was removed from the lens by aid of an electro-magnet.

CASE III.—F.M.—Injured ten days ago by particle flying from head of hammer. Commencing panophthalmitis. Fluoroscopic image not clear. Radiograph taken through the bones of face shows quite clearly a spot on the plate evidently caused by the presence of a metallic particle. Eye enucleated the following day. Metal found imbedded in ciliary region at nasal side of globe.

CASE IV.—L.M.—Received injury to left eye eight weeks ago while splitting logs, from particle flying from wedge. Faint scar in cornea a little to the nasal side of centre and in a line with

horizontal meridian. Lens opaque, complete posterior synechia, slight tenderness in ciliary region. Inflammatory symptoms comparatively slight at present, though from his statements they had previously been much more severe. Fluoroscope reveals nothing definite. Skiagraph taken through bones of face shows steel, but no positive indications as to location, excepting that it was anterior to the equator and very nearly in the horizontal meridian. The next morning, under anæsthesia, as wide an iridectomy as possible was made upward, and the tip of an electro-magnet introduced beneath the pillars of the coloboma on each side. Not finding the particle, the tip was gently forced through the capsule, and the click of the metal instantly followed. On withdrawing it from the eye, the minute size of the piece astonished me, as I had not realized before that so very small a particle could be detected on the photographic plate, when covered with so much tissue. Measured very accurately, it was two millimetres in length and one in thickness.

This case led me to study all my plates carefully, and from such study it appeared not to be a difficult matter to locate approximately the foreign body, in addition to detecting its presence. The possibility of this latter I felt had been definitely settled by the last case, but I had never before been inclined to believe that anything approaching accurate localization was possible.

Case V.—J. A., wood-chopper, was injured ten days prior to consulting me by chip flying from head of hammer. According to his statements, vision was not seriously impaired until the following day after he had used what I later learned was "Harlem Oil." Almost immediately on dropping this in the eye vision was practically abolished. No wound of entrance could be detected owing to a moderate chemosis surrounding the nasal side of cornea.

Aqueous cloudy with slight hypopyon under atropia; pupil dilated fairly well, showing a slight adhesion at nasal side. Yellowish reflex in pupillary area. No details of fundus visible. Lens transparent. Skiagraph shows a small particle at about the equator of the globe, but whether to the nasal or temporal side could not be determined. Efforts at extraction by an electro-magnet failing, enucleation was advised but refused. Patient did not return.

Referring to Fig. 1, which is a sketch made from the skiagraph of Case IV, it will be seen that the temporal rim of the orbit is very sharply defined. Anterior to it is a light area, and still farther forward a dark tongue-shaped space. These are designated respectively A, B, and C. The dark area A is the shadow cast by the dense bone at the orbital rim; B represents the tissue of both eyes and the orbital plates of the ethmoid; and C the lachrymal bones and the nasal process of the superior maxilla.

FIG. 1.—Reduced one-half from a skiagraph of Case IV.

Taking these as landmarks and applying to them deductions to be drawn from Cases IV and V, we have certain factors in locating the foreign body which, in general, are reliable. In Case IV the body was found in the lens, and the spot on the plate was about the centre of the area C, that is in the portion representing the lachrymal bones and the nasal process of the superior maxilla. In Case V the body showed itself in the light area, B, or in a line with the orbital plates of the ethmoid. As the lens in this case was transparent and the iris active, it is certain that the body must have been lodged back of the lens. For the average eye,

therefore, it would seem to be safe to assume that if the body shows in B, it is back of the lens, and if in C, it is either in the lens substance or in close proximity to it. When a body is outlined against the dense bone of the orbital rim, it will be found, in the vast majority of instances, to lie in the posterior pole of the eye.

For very prominent eyes these landmarks will hold good by simply making allowance for the assumed greater protrusion. Thus a body in the lens would show farther forward in C; one back of that body and near the equator would approach C; and one in the posterior pole would appear in the light area B. For deeply set eyes the opposite would be the case.

In this way we may arrive at a fairly accurate conclusion relative to the depth at which the body lies, but we are unable to determine its position in relation to the horizontal meridian, except by deductions drawn from its location with reference to certain anatomical points. For this purpose we may take either the upper or lower edge of the orbit, if plainly shown, and estimate its position by its proximity to either one or the other, or the junction of the nasal bones with the frontal may be used for the same purpose, as this point lies about in a line with the horizontal meridian.

As in every form of experiment, much depends on the character of the apparatus used. For taking skiagraphs of the hand and forearm a very small induction coil suffices, but where it is necessary to pass the rays through a large amount of soft and bony tissue, we require the most perfect appliances available, particularly as the element of time is an important factor, in view of the numerous cases of dermatitis already reported as having followed long exposure. Coils giving from six- to ten-inch sparks in air are large enough, if the tube is a good one and has a sufficiently high vacuum. Ten minutes' exposure with a good tube excited by an eight-inch-spark coil should be ample, and very good skiagraphs of the bones of the face may be obtained in half the time. The tube should not be placed closer than eight inches from the side of the face, and twice that distance if examination by the fluoroscope shows a fairly good outline

of the boundaries of the orbit and the antrum. The sensitive plate, either securely wrapped in light proof paper or placed in a plate-holder, should be strapped to the side of the face corresponding to the eye examined, either by adhesive plaster or by a light bandage. Large rubber bands I have found very convenient. The patient should be in an easy position, with the head inclined backward and resting against the back of the chair, which should be high enough to support the head. The eyes should be gently closed. This is absolutely necessary to good results. If allowed to remain open, it is an impossibility for the patient to keep them fixed on one object for the length of time necessary to take a good skiagraph.

The tube should be so placed that the centre of the platinum plate will be in a line joining the temporal edge of the orbits.

Any good sensitive plate answers our purpose, and I have found no great difference between rapid and slow ones. Those individually wrapped, such as are specially prepared for X-ray work by Corbutt, are very convenient and give excellent results.

While this gives us a fairly clear indication of the depth of a foreign body, and certainty of the presence of one, it does not enable us to accurately locate it. The most we can be certain of is its presence, and while in itself this is of enormous advantage, in certain cases accurate localization is much to be desired. With the hope of being able to do this, I experimented for some time in the following way:

Pieces of sensitive plate, three-fourths of an inch in width and two in length, with one end well rounded off, were wrapped in light proof paper and inserted as far as possible into the orbit between the globe and the lachrymal bones, and attempts made to obtain skiagraphs of particles of metal fastened to various points on the lids. While I could get a good image of the particles lying as far back as the plane of the iris, those placed farther back failed to be shown. If the plate was pressed deeply into the orbit, it was too painful, and in addition forced the eye back, so that nothing was gained. I was able in this way, however, to obtain fairly

accurate data relative to the position of the particle in reference to its depth within the limits above stated, and its position above or below the horizontal meridian. Inclining the head backward and inserting the plate beneath the upper edge of the orbit, and placing the tube on a line with the cheek, I tried to locate particles with reference to the vertical meridian, but the results were not satisfactory.

Finally the following method was tried in an experimental way by placing shot in various localities about the eye:

A plate closely wrapped in black paper was placed against the temple and firmly fastened by bandage or adhesive plaster. The tube in an adjustable holder stood twenty inches from the plate. Measurements were made from the platinum. The centre of the latter was placed as nearly as possible in a line joining the temporal edge of each orbit. A four-minute exposure having been made, the current was shut off, the tube lowered four inches, and the plate again exposed to the rays four minutes more. In this way two images on the same plate were secured which were separated to a degree equal to the angle formed by the lines emanating from the centre of the platinum. A simple mathematical calculation will then give the exact distance of the particle from either the tube or the plate.

An easy method of applying the measurements to the head is to use two cords adjusted to correspond to the imaginary lines drawn from the centre of the platinum in the tube to the sensitive plate. Placing them in front of the face with their extremities corresponding to the tube on the one side and the plate on the other, the point where they cross will show the position of the particle.

While these experiments were under way and about the time I had definitely satisfied myself of their value, the following case afforded me an opportunity to apply the results in actual practice.

N. J., aged 20, was referred to me May 31, 1897, by Dr. J. W. Bean, of Ellensburg, Washington, on account of an injury to his left eye due to the exploding of a rifle. Examination showed the cornea almost totally opaque and covered with exfoliating shreds giving it a decidedly ragged appearance. Upper lid moderately

swollen and very sensitive to manipulation, so much so that attempts at eversion were exquisitely painful. This seemed to be due to the generally inflamed condition of the globe and which I attributed to cyclitis consequent on the presence of a foreign body. Just beneath the brow a small freshly healed cicatrix was visible, not sensitive to pressure, and which marked the site of a small wound which, from the patient's statements, I took to be superficial, as he said Dr. Bean had probed it soon after the injury without finding a foreign body. Here I felt was an opportunity to test the method which had been successful in an experimental way. From the source of the injury it was impossible to decide whether the foreign body, if present, was steel or brass, owing to the fact that the cartridge was of the latter metal and the rifle of the former. My apparatus having been altered somewhat since my last case, by which more intense rays were generated, I felt quite confident that the results could be relied upon, and that should no foreign body be demonstrated assurance could be given that none was present.

The patient was placed in the position previously described, with a sensitive plate bandaged to the side of the face corresponding to the injured eye. The tube in an adjustable holder stood in this instance fourteen inches from the plate. This distance was taken, owing to the exceptionally broad face of the patient and the consequent thickness of the tissue through which the rays were obliged to pass. A four-minute exposure having been made the current was shut off, the tube lowered three and one-half inches, and a second exposure of four minutes made. On developing the plate two images of an L-shaped particle appeared separated about eight millimetres, and outlined against the nasal bones at their point of articulation with the nasal process of the frontal. Calculation showed the particle to be at a point midway between outer and inner canthus, and being so far forward it was either in the anterior chamber or in the lid. A small portion of the outer edge of the cornea being still transparent, a view of the anterior chamber could be obtained sufficiently clear to exclude the presence of so large a body as the plate showed, and I at once decided that it must be in the substance of the lid. The swelling of this structure was, while not excessive, sufficient to conceal a particle, and the condition of the cornea rendered caution in attempts at eversion necessary. Under anæsthesia palpation showed a hard substance in the lid midway between its free

border and the cicatrix already mentioned, which when removed by an incision was found to be a piece of the brass cartridge, identical in shape with the image on the plate. How it got there is and always will be a mystery to me. It was deeply imbedded in the tarsus and had cut through the conjunctiva. This may in part account for the lacerated condition of the cornea, though in a letter the attending physician states that the cornea was badly abraded when he saw him soon after the injury. Two sources of its presence may be considered: first, that it entered above at a point where the cicatrix shows, and was drawn downward by contractions of the orbicularis; second, that it struck the cornea and glanced upward against the lid. This latter is in some respects the less probable of the two, but how can the abrasion be otherwise explained? There was no burning of the tissues apparent, and the right eye was used for sighting. Recovery was rapid, and two weeks later the patient left the hospital with a very cloudy cornea but an otherwise uninjured globe.

More positive demonstrations of the value of the X rays could scarcely be demanded. While the sideroscope of Asmus, and the Haab magnet are unquestionably of great assistance in the majority of these injuries, in this instance they would have given no indications whatever owing to the composition of the body.

Though this plan gives us very accurate data for determining the position of the body relative to the vertical meridian, it gives us no indication as to its depth other than what we can derive from its position relative to the edge of the orbit. Were all eyes equally prominent this method would suffice, but at best we could only estimate its depth in this way. In order to apply the principles of triangulation, attempts were made to take skiagraphs with the tube placed at the back of the head and the plate against the brow and cheek; but the dense bone at the occiput and the large amount of tissue through which the rays were required to pass, prevented any reliable results from being obtained —at least with the apparatus at my command. Long exposures, fifteen to twenty minutes, were not tried through fear of producing a dermatitis, a rather severe experience of my own,[1]—having rendered me possibly over-cautious in

[1] *N. Y. Medical Journal*, January 23, 1897.

using the rays, particularly about the head and face. Moderately large bodies, such as No. 4 shot, were capable of detection, but fine No. 10 often failed to reveal their presence. For this reason I feel that unless a very powerful apparatus is at hand, the method of estimating the depth of a body by its position outlined against the various anatomical points, is a better one.

From my experience it appears justifiable to draw the following conclusions:

First. Foreign bodies of metallic nature other than aluminum may be detected in the eye in all but very exceptional instances.

Second. Their location may be determined with sufficient accuracy to guide us in operative procedure for their removal.

Third. Success will depend in great measure on the character of apparatus employed, the skill and experience of the operator and adherence to the rules given for the position of the patient.

Fourth. Long exposures with tubes excited by small coils should be avoided, owing to the danger of exciting dermatitis.

CASES OF OCULAR TUMORS.

By Dr. G. GUTMANN, Berlin.

Translated by Dr. J. A. Spalding, Portland, Me.

(*With Plate IX. of Vol. XXXI., German Ed., and Text-Plate VII.*)

So many cases of tuberculosis of the eye and of sarcoma of the uveal tract have been published, that new instances of the same disease can only be deserving of notice when they are extremely interesting in the individuality of their clinical appearances or in the curious course which they run. And these characteristics I think I can claim for some cases which were observed in our clinic in 1890 to 1892. One of them was of tuberculosis of the iris and ciliary body in one eye, and of tuberculosis of the choroid in the other eye of the same patient; three others were cases of sarcoma of the choroid which, when first seen, still showed perfect vision of the eye affected, whilst two others were in blind eyes. Cases like the first group have been seen but three times in all accessible literature, whilst enucleation of eyes with vision normal, or nearly so, has received but scattered notice, so far as I have been able to discover.

Case 1.—**Tuberculosis of the Uveal Tract in one Eye, and Choroidal Tuberculosis of the other Eye.**

A child of six months was brought to the clinic March 23, 1890, with the following history: He is the youngest of a family of three children, the eldest of which died at the age of five from scarlatina. The second child still lives, and is healthy. The mother is healthy, but the father was attacked with tuberculosis of the larynx in 1889, and died not long after at the age of twenty-eight with symptoms of uræmia.

The grandfather died of inflammation of the lungs, and the grandmother of erysipelatous inflammation of the feet at an advanced age.

The child had been previously healthy, but about a month before we saw it for the first time the mother observed an eruption on the head, and pustules on the face. At the end of a fortnight there became visible in the right eye a brown spot, which soon turned yellow and increased in size, though the eye itself did not get red or inflamed. The child was restless most of the time.

The general examination of the body showed a well nourished child with a bony fissure in the occiput, large fontanelles, and on both arms, scrotum, tibiæ, and face, numerous infiltrations of the skin, corresponding in appearance to *lupus miliaris disseminata*, and suggesting multiple, probably tuberculous abscesses. Pulse, 160 and regular.

The *right eye* has normal lids, conjunctiva, and cornea, but there are deposits on Descemet's membrane, the pupil is jagged and adherent, and on the lens capsule there is a gray patch.

The upper and outer quadrant of the iris is occupied with a yellow, cheesy, warty-looking growth, with a base of about 5 *mm*, and a rounded summit, projecting toward the centre of the pupil. It rests against the inner surface of the cornea, is sharply defined from the tissue of the iris, the margins are bordered with delicate vessels, and at the base there is an appearance like minute nodules in the tumor. The ophthalmoscopic image is normal, except that the optic papilla is somewhat hazy. Tension is normal.

The *left eye*, externally and internally, is normal, except for the following ophthalmoscopic details.

About two or three papilla-diameters from the optic nerve is a grayish, round, irregular tumor, the margins of which run over smoothly into the retina. The level of the summit of the growth is high above that of the retina. Considering the history of the case with the hereditary influence from the father, the case was undoubtedly one of tuberculosis of the iris of the right eye, and choroidal tuberculosis of the left eye.

The tumor in the iris of the right eye gradually increased in size, so that at first only the margin of the pupil was seen, then it passed across the pupil. Later it decreased in size, but at that time a rupture appeared in the sclera. In June, the tumor had perforated the globe of the right eye, and covered the cornea in the shape of a grayish, granulating mass, the conjunctiva was

greatly injected, and the eye was very tender to the touch. As the tumor grew, a second, smaller tumor sprang from its summit in the shape of a grayish bunch sharply defined as the original had been.

The left eye also changed greatly in appearance, with numerous fine iritic adhesions, delicate pupillary exudate, and, in the tissue of the iris, minute grayish nodules, especially in the nasal half. The ophthalmoscopic image was not so clear as before, but the choroidal tumor had evidently increased in size during the month since first seen. The left eye was of normal shape and appearance, but the iridic nodules had entirely disappeared from view. The optic papilla seemed much swollen, and was partly hidden by the increased growth of the choroidal tumor, which looked very nodular, and was whitish-gray in color, with walls of rather a bluish-gray appearance.

The child gradually becoming more and more unmanageable, evidently from the pain caused in the right eye by the enlarging tumor, enucleation seemed justified in order to save his life, and was safely done on the 10th of June. The patient remained perfectly well until the middle of July, when he was taken down with the measles, and soon died.

The autopsy showed an exanthema over most of the body, intestines swollen with gas, heart large and relaxed, both ventricles very soft, the left lung wholly caseous and interspersed with gray nodules. The spleen is also much enlarged, and exhibits many cheesy tubercles. The left kidney also contains tubercles, as well as the liver, which is fatty and very tuberculous.

The arachnoid membrane is much injected, and the left *corpus striatum* contains numerous cheesy tubercles. There are none of these in the arachnoid itself. Both optic nerves are flattened out, but are not white.

After death, the left eye was enucleated, both globes were laid in Müller's fluid, and later the right eye was divided by a meridional section into a nasal upper and a temporal lower half, and imbedded in celloidin, and then cut in serial sections.

The general appearance of the anterior portion of the right eye is shown in Fig. 1, where we see the cornea, anterior chamber, and anterior portion of the iris represented by a chestnut-shaped tumor. A small part of the cornea remains pushed inward and beneath, the anterior chamber is wanting, and only the

pigment layer of the iris remains. The retina and choroid are seen folded together in the centre of the eye, which collapsed owing to accidental opening of the globe during the enucleation, and as a result of which mischance also the optic nerve is missing.

The microscopic examination shows small round cells with mostly roundish nuclei, the cells lying very close together, and interspersed with occasional giant cells (see Fig. 2).

The left eye after being treated about as the other had been, showed near and just above the optic-nerve entrance and in the choroid a small tumor by which the retina was forced into the posterior chamber and detached. The choroid at the actual seat of the tumor is substantially destroyed. The tumor is composed of round cells and a few giant cells. The optic nerve where it abuts on the seat and vicinity of the tumor shows inflammatory infiltration with cells.

I would also remark that, in another section, from a different part of the globe, a second smaller choroidal tumor identical with the first was seen.

Figure 3 shows the larger of the two choroidal tumors. No trace of tubercle bacilli could be anywhere discovered either in the body or in the eyes, but despite their absence we feel perfectly justified in diagnosticating, from their presence in so many other organs of the body, tuberculosis of the iris of the right eye, and of the choroid of the left eye.

This case, then, may be added to the three already published of bilateral tuberculosis of the eyes. That of Haab[1] was one of late tuberculous disease of the second eye, in a tuberculous patient with the first eye affected with tuberculosis, but never enucleated. Castenholtz[2] reports tuberculous disease of an eye some months after the enucleation of the first primary tuberculous eye, and Hirschberg showed a case[3] in which from all the symptoms a solitary tubercle of the cerebellum was diagnosed, and in which was discovered later a small tuberculous focus in the choroid of both eyes.

Haab's case, therefore, was one of tuberculous disease of the conjunctiva and choroid of the first affected eye, as

[1] "Die Tuberkulose des Auges," *Arch. f. Ophthal.*, vol. xxv., part 4, p. 221.
[2] *C. f. A.*, vol viii., p. 456.
[3] *Neurologisches Centralblatt*, i., p. 553.

proved at the autopsy, whilst the other eye had an optic neuritis the nature of which was revealed by the examination after death. Castenholtz's case was not one of iris tuberculosis of the one eye which was enucleated, whilst later presumably the same disease produced blindness in the second eye. But an autopsy could only be made on the enucleated eye. So, too, in Hirschberg's case we have nothing but the clinical history; the ophthalmoscope showing in both eyes, just above the papilla, tuberculous deposits in the choroid, and bilateral choked disc.

Consequently, the case which I have just reported is *actually unique*, for in both eyes tuberculosis was not only observed during the life of the patient, but confirmed on the post-mortem table.

On the following five cases of sarcoma of the choroid, three were observed in eyes with good vision, and two in eyes that were blind.

Case 1.—On the 16th of September, 1890, a lady of thirty-two complained of a mist before the left eye of one month's duration. She had been married two years, and since then had suffered from a chronic nasal catarrh which resisted all treatment. Lately she had been curetted for endometritis, which, in connection with gonorrhœal vaginitis and cystitis, came on soon after her marriage. Otherwise than this, the patient has always been perfectly well, and there is no history of tumors in the family except that a sister had a small nævus removed some years before.

The condition of the eyes is: Vision perfect in each eye. The right eye is normal. The left eye shows loss of a segment of the visual field in the temporal superior quadrant. The eye, externally, is free from irritation and tension is normal. The ophthalmoscope shows hyperæmia of the papilla, and very fine opacities in the anterior portion of the vitreous body.

Just below the papilla is a whitish reflex which is seen to project into the vitreous about + 11 D. On dilating the pupil the surface of the tumor appears irregular, with elevations and depressions, whilst the whole tumor is dotted with pigment granules. The color of the tumor changes here and there to a yellow hue, and the surface is marked with numerous tortuous vessels. The concave reflector at 10 *cm* distance shows that the tumor reaches forward into the ciliary region.

Judging from the appearances, a pigmented sarcoma of the choroid was diagnosticated.

Examination of the other organs was negative. As there was a suspicion of a gummatous growth, since the husband had previously had syphilis, and had been treated by inunctions, and additionally as the eye had normal vision, an energetic inunction course was at once begun with the hope of saving the eye. But as this proved after some months of no avail, the field of vision showing a visible extension of the disease, enucleation was advised and performed in the following November. The eye was first placed in chromic-acid solution, then in Müller's fluid, and later wrapped in a guttapercha cloth and frozen. After being divided the Müller's fluid was washed out with a 50 per cent. solution of chloral hydrate, and the sections were treated with hæmatoxylin-eosin and borax-carmine.

The macroscopical appearance is well shown in Fig. 4, where we see a bean-shaped tumor in a capsule near the tips of the ciliary processes, with its summit directed toward the macula lutea. The surface of the tumor is separated from the posterior surface of the lens by a small cavity filled with coagulated vitreous. The interior of the tumor shows minute cavities surrounded by grayish tissue. The centre of the structure is spongy and black. The whole tumor measures 11 *mm* by about 9 *mm*. The rest of the eye appears normal.

Microscopically, the conjunctiva, cornea, iris, lens, vitreous, and optic nerve are normal. The tumor is chiefly composed of unpigmented small spindle-shaped and round cells with large oval and round nuclei and a scanty, finely-granular intercellular substance which is spread out into a reticulated meshwork. It grows with a broad base from the choroid, which is everywhere separated from the retina. The choroid is at places seen to penetrate the substance of the tumor in the form of broad striæ, with cells mostly small, but occasionally giant cells which lie along the sides of the blood-vessels, which pass through the tumor.

The minute cavities in the tumor contain cells which are elongated and suggestive of amœboid movements.

The retina is at places infiltrated with small pigmented cells, and occasionally so universally penetrated with tumor cells that of its actual structure nothing remains.

To sum up, the tumor evidently developed from the unpig-

mented round and spindle-shaped cells in the external layer of the choroid, whilst the inner layers are partly preserved above the tumor and form a sort of pigmented capsule, so that our diagnosis must be one of pigmented sarcoma of the choroid.

CASE 2.—A young lady of thirty-two came to the clinic January 10, 1891, complaining of growing more and more short-sighted during the past month in the right eye, and at the same time seeing what she called a shadow on the right-hand side of objects. She was unable to say whether or not the shadow had of late increased in extent. There was no pain. The left eye had always been poorer than the right, the one now affected. The patient's family history was not good, her father dying two years before of cancer of the liver, after previously suffering from a tumor of some sort in the right eye. Prof. Schoeler, who was at that time in charge of the patient, wrote me that, although the eye was not enucleated, he had no doubt of the tumor being a melanoma of the choroid.

Present condition: O D is apparently normal externally, and with + 1.50 reads $\frac{15}{20}$, and diamond type. The visual field is contracted outward and upward. The tension of the globe is normal.

The left eye has corneal opacities, is very hyperopic, and yet obtains with the best lens + 3 D S only $\frac{1}{18}$ of normal vision. Vision is increased to $\frac{1}{6}$ by adding to the above lens a + 3 D C axis 90. The patient reads with much difficulty Schweigger's type 3, and, with the above compound lens, Schweigger 1.3 at 15 *cm.*

The ophthalmoscopic image of O S is normal, that of O D shows a grayish reflex by ordinary daylight, and with the lamp a brownish mass behind the lens apparently arising from the ciliary region and covering the upper $\frac{2}{3}$ of the pupil. The anterior chamber seems much flattened toward the nasal side and downward.

On using lateral illumination, and still better by transillumination of the eye, the tumor is plainly visible when the patient looks in and down. With a magnifying lens a striated surface can be distinctly made out, and on the top of the tumor a gray fold, over which run fine vessels, which gradually are lost in the tissues of the growth. The gray fold passes backward into a dappled membrane, also covered with vessels. It would almost seem as if this gray tissue were the detached retina.

Farther backward we see a grayish retina, pigment patches in the choroid, and a portion of the optic papilla, the rest being covered with the large tumor. With the exception of very fine opacities in the vitreous the interior of the eye seems otherwise healthy.

It was with regret, this being the better eye of the two, that, after mature deliberation, I advised enucleation, which was consented to, and the operation performed on the 16th of January.

After the eye had been hardened and treated as usual, it was divided in such a way as to make a good section of the tumor *in situ*, together with the various structures of the globe, and the general appearance is shown in Figure 5.

In the nasal posterior quadrant of the globe we see an oval projecting tumor of firm consistence and dark-brown color. It rests on the sclera, extends forward to the angle of the anterior chamber and backward to within 6 *mm* of the optic-nerve entrance. Its greatest length is 14 *mm* and its greatest height 10 *mm*. The surface of the tumor is rather flattened in front and covered with the choroid and retina, whilst behind only the choroid follows the contour of the tumor, whilst the retina rises in a wavy fold into the vitreous chamber, and is reapplied again to the choroid only near the optic nerve.

The microscopic examination shows an alveolar structure, composed of thickly packed, small, round cells, together with small, round cells with large round nuclei, which bear considerable resemblance to smooth muscle-cells; there is also a finely granular substance with fibrous connective tissue. The chief mass of the tumor is pigmented darkly brown. The pigment is contained in the shape of extremely fine granules in the spindle-shaped cells, and in coarser globules in large giant cells of regular and irregular rounded contours. Occasionally the pigment forms large clumps in the tissue of the tumor.

The sclera as well as the ciliary processes contains some pigment cells, whilst the ciliary body itself is infiltrated with closely packed but mostly unpigmented tumor cells. The cellular infiltration extends to the lig. pectin. and Descemet's membrane.

The choroid is perfectly preserved in the posterior fifth of the tumor only, where we can recognize all of its layers. But from there forward the layers, one after another, become lost in the tumor.

The retina, aside from the above-mentioned detachment, shows nothing abnormal except a few pigmented and flattened tumor

cells in its external layers, which toward the ora serrata become more numerous and there extend deeper and deeper into the inner layers of the retina. And just behind the region of the ora serrata we see vacuoles between Müller's radiating fibres.

The microscopic examination showing a pigmented spindle-celled sarcoma of the choroid, we find justification for the enucleation of the patient's better eye, in having so far preserved the patient from death from melano-sarcoma of some other organ, as in the case of her father.

Examination a few days ago shows that the patient is able to earn a living with the sight of the other eye, which, with lenses as before, brings V to $\frac{1}{4}$ and Schweigger 1.25 type at 8″.

CASE 3.—Mrs. H., æt. fifty-four, seen December 26, 1891, has observed before both eyes, but especially before the right, a shadow which she describes as being in the upper portion of the field of vision, and gradually increasing in size. The present condition is O D $\frac{20}{100}$, and with + 2 D S $\frac{20}{40}$. With + 3 D S she reads fine print easily. O S V. = $\frac{20}{100}$. + 2 D C axis 45° $\frac{20}{30}$; adding + 3 D S, fine type.

The field of the left eye is normal, but that of the right eye shows a defect in the upper half, reaching almost to the centre.

The left eye is normal except for hyperopic astigmatism.

After dilating the right pupil one sees just behind the lens a grayish reflex, and by transillumination in the depth of the eye a yellowish mass in a gray envelope covered with tortuous vessels, and showing brighter and darker folds on focal illumination, resembling a retinal detachment. This gray vascular envelope is plainly enough the detached retina, but it is not like a typical detachment, movable with the motion of the eye. The folds do not float about, but remain fixed and immovable when the eye moves to and fro. The vitreous contains a large number of fine opacities. The papilla, however, is plainly visible, despite these, and shows a refraction of + 2 D S. The summit of the tumor similarly measured is + 12 D S.

A diagnosis of choroidal tumor, probably a sarcoma, was made.

Examination of the body showed emphysema of the lungs, liver pressed somewhat downward, some ozæna. Reflecting on the latter point and its possible origin from syphilis, iodide of potassium was given in large doses, and also inunctions freely employed. This being fruitless, enucleation was advised and performed March 4, 1892.

After the usual treatment and sections the appearance was as shown in Fig. 6.

The lower half of the globe contains a roundish tumor with a broad base and of grayish-brown color, rather firm in consistency and rising to the middle of the vitreous chamber, measuring 22 *mm* across and 9 high. Right over the summit of the tumor and passing through the centre of the vitreous lies the totally detached retina which must have become detached during the enucleation, as the day before the upper half of the retina was *in situ*, as proved by tests of the visual field, and demonstrated by the opthalmoscope. In front of this detachment is a grayish-white mass presumably of coagulated albuminous bodies, and the same sort of tissue fills the gaps between the other portions of the tumor and the surface of the retina.

The microscopic examinations show the tumor to consist of closely-packed brownish spindle cells with occasionally finely-granular connective tissue. The nuclei, which stain blue with hæmatoxylin, are oval. The centre of the tumor has abundant pigmented round cells with small round nuclei. Here and there are scattered clumps of pigment in the tissue. There are but few blood-vessels, chiefly veins.

The choroid is totally absorbed in the tumor, except in the lower half of the anterior portion of the surface of the tumor, where we can see the lamina vitrea, upon which lies the pigment epithelium of the retina, infiltrated with pigment cells from the tumor. The posterior surface of the tumor also shows a trace of the choroid, but it is soon lost in the tissues of the tumor itself.

The clinical diagnosis of a malignant tumor of the choroid is consequently confirmed by the anatomical examination, and the case is one of pigmented spindle-celled sarcoma of the choroid.

The early enucleation of the eye was therefore demanded although it could read the finest type. A year and a half have passed away and there has been no sign of a relapse in any part of the patient's body.

Case 4.—April 21, 1890, Mr. H. applied for the relief of pain in his inflamed right eye. The inflammation came on a day or two before, and was already very violent. The patient first noticed four weeks before that he could no longer see with that eye. The cornea was very hazy, anterior chamber abolished, and the pupil contracted with adhesions. The lens was apparently opaque, and all that could be seen of the interior of the eye with

the ophthalmoscope was a darkish brown reflex. Just above the sclero-corneal junction was a dark brown spot, and a slight ectasia. Tension was +3. The left eye was normal.

We diagnosticated secondary glaucoma of the right eye, probably due to an intra-ocular tumor. Examination of the internal organs of the body showed no abnormity and the urine was free from albumin, sugar, and melanin. Enucleation was performed April 23d.

After being treated in the usual way the globe was opened and many sections made, the macroscopic condition of some being shown in Fig. 1, Plate IX.

The anterior chamber is partly filled with coagula, and in the upper half flattened by the pushing of the iris against the apparently normal cornea. The lens is subluxated upward, and touches only the upper pupillary margin, and its upper half is so pressed forward that it seems smaller at the top than at the bottom.

The retina shows a funnel-shaped detachment. The upper part of the globe is filled with a brownish tumor measuring 14 *mm* in height and about 20 *mm* in greatest breadth.

The microscopic examination shows in the anterior chamber on Descemet's membrane a finely granular mass which in the upper portion of the chamber is interspersed with numerous closely packed, and then again irregularly-formed masses of pigment. A similar mass fills the space between the upper half of the iris and the cornea and the superior angle of the anterior chamber. It contains dark-brown pigmented cells and clumps of pigment which lie close beside one another in smaller and larger groups. The pigment itself is minutely granular. The ciliary body and processes are thinned by atrophy.

The fibres of the lens in the nuclear region are well preserved, but near the anterior capsule and still more near the posterior they are separated by fissures. Within these, we see globular bodies reminding one of fat-cells.

The tumor is composed mostly of spindle-shaped large and small pigment cells in which the coloring matter is contained in very minute yellowish-brown granules which renders the nucleus invisible, and of abundant inter-cellular substance. Larger pigment heaps lie scattered about. The tumor is marked by numerous fissures, cavities filled with blood corpuscles, and smaller cavities of which but few seem to possess a thin internal envelope.

The sclera is normal except for a small space at the base of the tumor where the growth has invaded it.

The choroid is almost totally destroyed by the tumor, but here and there traces of the lamina vitrea and the stroma can be seen infiltrated with cells.

The detached retina is atrophied, only the nuclear layers remaining in the least preserved.

The diagnosis of probably a malignant tumor was thus confirmed by the microscopic examination, the pigmented spindle-celled sarcoma of the choroid having grown from the choroid upward and backward and then pressed upward and forward as is shown by the position of the dislocated lens.

The pigmented tumor elements in the anterior chamber were probably drawn there by suction from the tumor by the currents of the eye.

Case 5.—Mr. G, æt. fifty-six, consulted me in November, 1890, for inflammation of the right eye which had begun only four days before. Three years before the eye had gradually become blind within the space of three months, and a year ago the eye had been inflamed for some weeks, but this gradually subsided and the eye was quiet. No treatment was given at either time.

The anterior portion of the eye looks flattened and there is much circumcorneal injection. The cornea is partially necrotic, and covered with a dirty mass, which extends back into the anterior chamber, covers the pupil, and prevents any examination of the interior of the eye. The upper portion of the ciliary body is painful to the touch, tension is increased, and the eye is blind.

More careful investigation showed that three years before the patient had been to an eye clinic where amaurosis dependent on detachment, accompanied with increased tension, had been diagnosticated. The patient did not, however, return for treatment.

Enucleation was at once urged on the presumption that the case was one of intra-ocular (probably malignant) tumor which had excited the irido-cyclitis and glaucomatous symptoms. The operation was performed on November 21st.

The freshly-enucleated globe showed just in front of the optic-nerve entrance and above the horizontal meridian a small pin-head-sized spot in the sclera, rising a little above its surface.

Presuming that this spot indicated a tumor pressing forward through the sclera, the eye was divided in such a way as to show the interior to the best advantage, that is to say, into two por-

tions, one larger than the other, and represented in Figure 2, Plate IX.

The tumor occupies two thirds of the interior of the eye, and is attached by a broad base to the sclera, which it penetrates near the optic-nerve entrance. It fills the entire space between the optic nerve and the lens, with the exception of one or two small fissures. Its color is dark brown, and it is very firm in consistence. It measures about 16 *mm* longitudinally and 15 *mm* transversely.

The upper surface of the tumor is wavy, and between this and the lens is a grayish-white mass completely surrounding the lens, and filling the space between the surface of the tumor, iris, and ciliary body. Between the pupil and the cornea lies a grayish, yellow mass.

Microscopic examination shows the chief mass of the tumor to consist of dark-brown, pigmented, closely-packed, small, spindle cells with oval nuclei, and occasional finely granular and fibrous intercellular substance. Interspersed, are unpigmented larger and smaller round and spindle cells, the former with round, the latter with oval nuclei. There are also many large pigment cells resembling giant cells. The pigment is in the shape of the very finest granules. Toward the surface these large pigment cells are flatter and more oval. The surface of the tumor exhibits numerous veins, the wall on one side or the other being broken by pressure. At the spot where the tumor has perforated the sclera it presses teat-like forward into the episcleral tissue.

The choroid is, as is usual in these tumors, present in some portions of the tissue, and then again entirely destroyed except the lamina vitrea, which is almost everywhere preserved. The retina is detached, and in some portions infiltrated with the pigmented cells of the tumor.

The lens, whose capsular epithelium is well preserved, contains many fissures between the fibres, in which lie larger and smaller, occasionally confluent, homogeneous, nine-pin-shaped structures, and in the anterior and posterior portions of the cortex one sees numerous vacuoles, indicating the formation of cataract.

The iris and ciliary body are atrophic, whilst the sclera at the spot of perforation is marked with an infiltration of pigment cells from the tumor.

The cornea and bulbar conjunctiva are slightly infiltrated with pigment cells, whilst there are also traces of cicatricial formation and thickening.

The anatomical investigation, therefore, reveals a pigmented spindle-celled sarcoma of the choroid, which at one spot has perforated the sclera, and the clinical diagnosis of a malignant tumor is confirmed. Unfortunately, enucleation could not be performed until after the tumor had perforated the sclera. The patient never returned for examination, but investigation brought out the fact that he returned home and died in 1893, presumably of cancer of the liver.

The cases of choroidal sarcoma here reported confirm the opinion expressed by Freudenthal,[1] that the prognosis in this disease is not so hopeless as it has generally been regarded, provided that the enucleation of the eye can be done in an early stage.

Fuchs has shown in his monograph[2] that relapses occur most frequently during the first four years after the operation, so that an eye that has remained free for that length of time from relapses will probably forever remain free from any farther attacks. Metastasis, according to the same author, generally occur within two years from the time of operation, and he never knew of a case in which metastasis occurred later than five years.

In the first three of my cases five years, in the second four, and in the third three and a half years have passed since the enucleation, and there has been neither relapse nor metastasis. In all three cases I have removed the seeing eye, in two cases even the better seeing eye, after the diagnosis had been established. The second case is of interest owing to the evident hereditary influence, the father of the patient suffering from choroidal sarcoma, and of the right eye too, though it was not removed. He died from metastasis in the liver. The fourth case, which I saw in the second stage only, that is, after the eye had become blind, may be regarded as cured, since five years have passed since the operation, and the patient has remained well to this day. The fifth case came too late,—during the third stage,—at which time the tumor had perforated the sclera, though but a trifle in extent. There was indeed no local relapse,

[1] "Ueber das Sarcom des Uvealtractus," *Archiv f. Ophthal.*, xxxvii.
[2] *Das Sarcom des Uvealtractus*, Wien, 1882.

but in the third year after the enucleation the patient died from metastasis in the liver.

It is very rare that one has the chance to operate at so early a stage as in my first three cases. Amongst 221 cases of sarcoma of the choroid collected in Fuchs's monograph, there were only four with reasonably good sight just previous to enucleation, but it was in no case so good as in mine. In his own list of 22 patients there was none with useful vision in the eye enucleated. Freudenthal saw fairly good vision, from $\frac{1}{5}$ to $\frac{1}{10}$, in four of his 24 cases, and one with vision of $\frac{2}{3}$ and this one died from a local relapse some ten years later. One case with vision $\frac{1}{5}$ died four years later from metastasis. Fuchs grants only six per cent. of favorable results, but Hirschberg,[1] as well as Freudenthal, claims thirty-eight per cent. of favorable results.

After due consideration of the two cases of Freudenthal, it seems to me I have the right to call "cured" the first four cases here communicated, and to express the hope that the cure is definite.

Description of the Drawings on Text-plate VII and Plate IX.

Text-plate, FIG. 1.—Meridional section through the anterior portion of the right eye of a child. (Tuberculosis of the eye.) Direction of the section from outward and upward to inward and downward. Temporal lower half.

FIG. 2.—Tuberculous infiltration in the anterior portion of the same eye. (Giant cell and neighborhood.) Zeiss eye-piece 8, Objective A, A.

FIG. 3.—Macroscopic view. (Lens.) Sagittal section through the papilla of the left eye (temporal half) of the same patient.

FIG. 4.—Choroidal sarcoma (Case 1). g = Tumor.

FIG. 5.—Choroidal sarcoma (Case 2). g = Tumor. n = Detached retina.

FIG. 6.—Choroidal tumor (Case 3). g = Tumor. n = Detached retina.

PL. IX., FIG. 1.—Choroidal tumor (Case 4). g = Tumor. n = Retinal detachment. l = Lens dislocated upward. v = Pigmented tumor-elements in the anterior chamber lying on the upper half of the iris.

PL. IX., FIG. 2.—Choroidal tumor (Case 5). g = Tumor. n = Retinal detachment. l = Lens.

[1] "Zur Prognosis des Aderhautsarcoms," *Virchow's Archiv*, Band xi. ("Achte Folge," Band x.), Heft 1.

OCULAR PARALYSES OCCURRING IN THE COURSE OF NEPHRITIS. WITH REPORT OF CASES.

By JOHN DUNN, M.D., Richmond, Va.

KNIES, *The Eye in General Disease*, 1895, p. 307, says: "Little is found in literature concerning paralyses of the ocular muscles in albuminuria. . . . They are so frequent, however, that in every case of sudden, or rapidly developing paralysis of the ocular muscles with the character of basilar, root or nuclear paralysis, the urine should be examined for albumin. The cause generally appears to consist of a hemorrhage in the region of the nerve roots or nuclei, possibly even in the nerve itself."

He then mentions briefly three cases of such ocular paralysis seen by him. Dufour, *Annales d'Oculistique*, March, 1890, tabulates 220 reported cases of nuclear paralysis of the ocular muscles; albuminuria is mentioned as coexisting in but one instance, and in this one it was "transient"—nor has search through the special writings within my reach revealed another mention of the coexistence of ocular paralysis and albuminuria, except the case recently reported by Hensell. In Knies's three cases and in Finlayson's one (*Jahr. f. Aug.*, 1897, p. 240) cited by Knies, the fundus showed no evidences of albuminuric retinitis. The following three cases, then, do not lack in interest.

Case 1.—M. R., aged thirty-six, farmer, hard drinker, was seen first April 9, 1897. Past history imperfect; patient had suffered with severe headaches off and on for six weeks; for the past three weeks his eyesight had been getting bad, till within the last few days he was no longer able to read. Examination of his eyes showed a slight degree of divergence for both. Patient was un-

able to move either eye in any direction, up, down, in or out, nor did the effort to move the eye cause the slightest rotation of the ball. There was no ptosis, the patient having perfect control of both upper lids. When told to close his eyes tightly and then open them, very slight motion was communicated to the eyeballs at the moment of the lifting of the upper lids; pupils responded to light both directly and consensually. There was absolute loss of motion of the pupil in the accommodative effort. As all power of convergence was lost, the experiment was made of holding a pencil some distance from the eye and gradually bringing it close before the pupil—the pupil remained stationary. Power of reading was entirely lost; there was, so far as I could decide, complete paralysis of the ciliary muscle. Vision $\frac{8}{200}$ O. D. $\frac{7}{200}$ O. S.; pupils dilated under atropia. Examination of the fundus revealed œdema of the retina, together with numerous hemorrhages and the characteristic white patches of albuminuric retinitis. Urine contained both albumin and casts. No other paralyses than those mentioned were demonstrable. Ten days later the patient was seen. The condition of the eyes was unchanged save that a slight tremulous motion was imparted to the balls when an effort was made to turn them in any direction. On June 3d œdema of the ankles and lungs was present. Vision, however, had risen to $\frac{1}{60}$ O. D. and O. S. Accommodation was no longer paralyzed; slight movement of the interni was now possible, especially noticeable with the accommodative effort; other muscles as on April 9th. About two weeks later the patient died.

Case 2.—M. J., aged sixty-nine, seen April 14, 1897. He complained of dimness of vision, which dated back five days and which followed an attack of "indescribable sensations" in the head, which left him for a few moments mentally "much confused." Examination of the eyes revealed *paralysis of the right superior oblique.* Vision O. D. with a $+ 1\frac{1}{2}$ D sph. $= \frac{1}{10}$; O. S. $= \frac{1}{2}$. Media clear. Both retinal arteries and veins contracted. No hemorrhages in either fundus. The region of the macula in both eyes showed a more or less circular area of retinal degeneration, more extensive in the left, where it was as large or larger than the optic disc. The changes consisted of small, yellowish areas between which and over which the retina appeared healthy. Urine showed neither albumin nor sugar, but *epithelial casts.* The patient stated that he voided his urine frequently and in large quantities. By June 5th the paralysis had disappeared. Treatment—iodide of potash.

Case 3.—M. A., aged forty-five, seen first in the spring of 1896. Spasmodic tic affecting chiefly the *right oculo-facial fibres*, although the elevators of lip participated to some extent in the spasmodic movements. Retinal arteries and veins both showed considerable contraction when patient was first seen. There was also a small retinal hemorrhage present. Tests gave urine free from albumin, but containing *hyaline casts*. Patient has now been under observation for one year, during which time there have appeared œdema of the ankles and lower portions of the lungs and hemorrhage into the *conjunctiva*. The spasmodic tic has persisted and is most annoying.

In Case 1 the history, as well as the changes in the fundus, suggest that there existed in the region of the nuclei of the third, fourth, and sixth nerves, a condition not dissimilar to that shown in the retina, viz:—œdema, hemorrhages, and areas of nerve-nuclei degeneration. The nuclei involved present an interesting picture—complete ophthalmoplegia externa, except for the levat. sup. palp., and to this is added paralysis of the ciliary muscle. Inasmuch as the visual acuity was so much reduced, it may be doubted whether ciliary paralysis existed. If the associated movement of the iris in accommodation occurs in a purely mechanical manner, *i. e.*, as the result of blood being forced into it by the contraction of the ciliary body, then there existed paralysis of the accommodation, for no movement of the iris occurred when objects were brought close before the eye, and this, although the double response to light was retained. This mixed form of ophthalmoplegia bears out strikingly the suggestion of Darkschewitch, advocated by Knies, that the accommodation nucleus is separate from that regulating the movements of the pupil, and is situated behind that of the levator and nearer the other massed nuclei of the third nerve. In this case we have ophthalmoplegia occurring in the course of *acute nephritis accompanied by albuminuric retinitis.*

In Case 2 we have an example of an ocular paralysis, associated with retinal changes and *chronic nephritis*, the latter established by the presence of epithelial casts in the urine. In this case, as well as in Case 3, the importance of microscopical examination of the urine is shown, for in

neither instance was albumin present in the urine at the time of the implication of the ocular muscle. In both Case 2 and Case 3 we find retinal changes: in the former, degeneration of the retina in the region of the macula; in the latter, retinal hemorrhage; in both, contraction of the retinal vessels. In both it is likely that the muscular affection was due to hemorrhage.

In Case 2 we find complete recovery of muscular action following paralysis due to hemorrhage occurring in the course of chronic nephritis; this hemorrhage was either into the nucleus of the fourth nerve, or into its root fibres in their downward course, and this latter is, perhaps, the more likely because of the concomitant mental confusion at the time of the apoplectic attack. It may be objected that in Case 3 we have not to do with a case of paralysis of an ocular muscle. The case, however, has here been reported inasmuch as it adds to the details of the subject in hand. In Case 3 it seems not improbable that the seat of trouble is the small vessels which supply the body of the facial nerve. The case is further interesting, in this connection, as showing the coexistence of chronic Bright's disease, retinal changes, and convulsive tic affecting the oculo-facial fibres. It would seem fair to infer from the above cases that the ocular paralysis accompanying nephritis may have two causes. The first, that shown in Case 1, a localized albuminuric cerebritis; the second, that shown by Cases 2 and 3, hemorrhage from vessels whose walls have undergone degeneration. In old persons, where there coexist an ocular paralysis and retinal hemorrhages, while we may suspect accompanying kidney disease, it does not always exist, and it is well, in all such cases, to examine the urine before a full diagnosis is given. The following is a case in point.

Mr. A., aged sixty-eight, on May 4th, while out walking, suddenly became unconscious, and remained so for some minutes. Examination a few days later revealed *a complete paralysis of the right third nerve and a retinal hemorrhage.* The urine, examined at this time and later, proved to be normal. When seen, about two months after the attack, the paralysis remained complete. In September, 1897, however, considerable motion had returned to the paralyzed muscles.

PHYSIOLOGICAL AND HYSTERICAL DIPLOPIA.

By Dr. LIEBRECHT, Hamburg.

Translated and slightly abridged by Dr. Duane, New York.

FOR some time I have been engaged in the study of cases of hysterical diplopia, a condition which, since the labors of Charcot and his pupils, has been one of particular interest.

One characteristic of diplopia in hysterical patients I should like particularly to emphasize in passing. This is the exceedingly slight subjective disturbance that such diplopia causes; the patient alleging that it is present only part of the time, or in connection with special objects, or that it gives him so little trouble compared with his other symptoms, that he may even fail to realize its existence until his attention is called to it.

The more I examined these cases, the more was I surprised to find in what a very large proportion diplopia developed as soon as the eyes were turned in certain directions. I found, in fact, diplopia in almost all that I examined. I at first ascribed this to the special nervous condition present, and for purposes of comparison proceeded to examine a number of persons unaffected with hysteria. I used for this purpose fifty dispensary patients of all ages, taking them as they came. This examination brought to light the fact, so far apparently overlooked,[1] that *for certain positions of the*

[1 This is hardly correct. For example, Alling (these Archives, xxiv., 3, p. 374), in speaking of 56 normal cases that he examined, says: "Diplopia at a distance at the periphery of the field is of common occurrence," and the translator of the article (*ib.*, xxiv., 4, p. 496) says: "Diplopia occurring at the limits of the field of fixation is physiological."—Translator.]

eyes diplopia is a physiological phenomenon, and that there is only a very small proportion of persons (6 out of 50) in whom such a diplopia cannot be evoked by suitable means.

The examinations gave all pretty much the same results, so that I will adduce only three cases as samples. The first two represent the comparatively rare form in which the distance between the double images is great, while the third case may be regarded as typical.

It may be added that in none of the cases was there a relative divergence for distance, or anything but a slight divergence for near. The light that served as a test object was placed at a distance of 3 *m*, and, for the better recognition of the double images, was backed by a large black screen.

Case 1.—Mrs. Behrend, aged fifty-four. R. and L., Hm. 3 D; V = $\frac{6}{6}$. Never had diplopia.

In straightforward directions of the gaze, single vision both with and without the red glass. If the light is kept fixed and the head is turned 20° either to the right or to the left, diplopia occurs. Double images on a level, homonymous, and separating as the head is turned laterally. Their greatest distance is 25 *cm* when the eyes are turned to the right, and 50 *cm* when the eyes are turned to the left. When the gaze is directed downwards, there is likewise homonymous diplopia, but the image of the right eye is lower, and is tilted away from the other image; and when the gaze is directed upwards, there is homonymous diplopia, and the image of the right eye is higher, appears farther off than the image of the left, and is tilted to the right.

Case 2.—Christine Christensen, aged thirty. With the eyes in the mid-position (gaze directed straightforwards), no diplopia. When the eyes are rotated 30° either to the right or left, homonymous diplopia ensues, the double images being $\frac{1}{2}$ *m* apart when the gaze is directed far to the left, and 1 *m* when the gaze is directed to the right. The double images are not constantly present, there being sometimes single vision up to the extreme limits of the lateral excursion.

When the gaze is directed up or down (by movements of the head, the object of fixation remaining still), there is a homonymous diplopia, the images being 10 *cm* apart, and on the same level with each other and parallel.

The ordinary distance between the double images was not as great as in the two cases above cited, although it often reached 20–30 *cm.* The most usual distance was 5–10 *cm*, as in the following:

CASE 3.—Hünecke, Dietrich, aged forty-six. R. and L., E.; V = $\frac{6}{6}$. Without red glass very slight homonymous diplopia when the eyes were directed down; no diplopia in other parts of the field. With the red glass, homonymous diplopia when the gaze was directed to the right or left. Maximum distance between the double images 5 *cm.* Homonymous diplopia also in looking up or down, the image of the left eye in both instances being somewhat lower than that of the right. No tipping of either image.

These three examples give an idea of the way in which the diplopia developed and of its character. It appears when associated movements of the eyes are made either in the vertical or horizontal direction; usually not until the excursion movements have been carried nearly to the extreme limit of which the eye is capable, but sometimes occurring when the eyes have made but a comparatively slight excursion from the primary position.

A peculiarity of this diplopia is that *it never makes its appearance spontaneously;* but is made evident only by an appropriate examination. In some cases the double images are noticed only when the patient's attention has been directed to them. When once observed they are usually found to persist through a considerable portion of the arc which the eye describes in passing from the extreme limit of its excursion back to the primary position.

Again, the diplopia *in all cases is homonymous and, moreover, is so for all directions of the gaze.* Only in one case were the images crossed; and even here this was the case only when the eyes, were directed upwards; the diplopia elsewhere being homonymous. Furthermore, the *double images do not correspond to a paresis of an ocular muscle, but are to be regarded as due to irregularities in the associated movements of the eyes, resulting from the normal limitation of the ocular excursion movements.* The relation of the double images in the lateral movements of the eyes might, it is true,

be explained by a bilateral paresis of the abducens. But that the muscles are not the sole cause of the diplopia is evident from the behavior of the double images when the gaze is directed up or down. As is apparent from the examples cited and from all the other cases also, the relation of the double images for upward and downward directions of the gaze hardly ever corresponds to that due to the paresis of any single muscle, *e. g.*, one of the other obliques, which, on account of the homonymous diplopia, we should naturally suppose [1] to be the muscles concerned. As a matter of fact, almost every case differs from the other. Sometimes the images are on the same level, sometimes the image of the right eye and sometimes that of the left is above, sometimes the lower image is tilted towards and sometimes away from the other, and sometimes the images stand parallel. The diplopia, therefore, is not attributable to a failure of any one muscle, but to an irregularity in the associated movements of the eyes; the correlation of these movements which exists through a large portion of the field of fixation, failing as the eyes get near the limit of their excursion. And it is always the eye that is turned to the temporal side that is the first to give out. This predominance of the forces that act to move the eyes inwards is shown, too, when the gaze is directed up or down, homonymous diplopia being always present under these conditions.

These facts are explainable, I think, by the investigations made by Volkmann, Hering, Donders, and A. Graefe upon the extent of the associated movements. These experimenters all found that the power of inversion of the eye exceeds its power of eversion, the inversion of either eye amounting in extreme associated movements to 44°, while the maximum eversion of its fellow is only 40°. A. Graefe thought that this fact constituted an exception to the law of the strict

[1 As Mauthner (Augenmuskellähmungen) pointed out and as experience since has abundantly demonstrated, this inference of the author's is erroneous. While paresis of the obliques is typically associated with homonymous diplopia, there are cases of such paresis in which, owing to complicating conditions, double images are crossed; and *per contra* there are not a few cases of paresis of the superior and inferior recti which, for similar reasons, are associated with homonymous diplopia.—TRANSLATOR.]

equality of associated movements. To my thinking it means that the associated movements of the two eyes are strictly equal for lateral excursions of 40°; but that at this point the eye that is moving outward ceases to move any longer while its fellow keeps on moving for 4° more. In a minority of cases the point at which the interference with associated movements takes place is not at 40° from the primary position, but at some point nearer the latter, *e. g.*, 20° (Case 1) or 30° (Case 2). In these exceptional cases we are probably justified in assuming a weakness of the external rectus; a view which is corroborated by the fact that when one eye was covered the other, it seemed to me, did not move outwards in performing fixation to the same extent or with the same force as usual.

These facts are not only of physiological significance but are also *important from a diagnostic point of view.* As above stated, I myself at first regarded the results I found as pathological until I had extended my investigations to evidently normal subjects. I am persuaded that Guillery in his investigations upon latent disturbances of the eye muscles in tabes has fallen into this same diagnostic error.[1] For, using the same methods that I did, he found that in a large proportion of tabetic patients there was diplopia when the eyes were carried in one or the other lateral direction, and this diplopia he regards as due to pareses of the ocular muscles of tabetic origin, which remain latent for a time, and are then discoverable only by the appropriate examination. He says, too, that in numerous control-experiments made upon healthy persons, he never observed diplopia of this sort. As I have pointed out above, this is a mistake. In these patients the diplopia was not the consequence of the tabes, but had existed all their life. *We should hold fast to the fact that real paralysis of a muscle, no matter how slight, gives rise to diplopia, which the patient, provided he can see well enough to distinguish double images, is always cognizant of spontaneously, so that no examination is necessary to bring them out.*

[1 See Dr. Guillery's comment upon this statement, appended to this article.—TRANSLATOR.]

II.

The second part of my paper has regard to *hysterical diplopia*, a condition which has many points of contact with physiological diplopia, although it also has peculiarities that distinguish it from the latter as well as from the form of diplopia occurring in ordinary muscular paralysis. Since cases of hysterical diplopia are not very frequently reported and the condition itself receives but brief and summary mention in text-books, I adduce here a few cases of it which will serve to demonstrate the clinical history. I do so the more because they have been under observation for a comparatively long time. I should like to add that in this case as in that of physiological diplopia, the condition did not impress me as being due to a paralysis of one or of several muscles, but to a disturbance of central origin affecting the associated movements of the eyes.

The neurological examinations I owe to the kindness of Dr. Saenger.

CASE 1.—Pröhl, Clara, eleven years of age, complains for some weeks of poor sight; can read nothing but the large letters on the blackboard, and nothing at all from the book. Lamplight causes marked dazzling. Neurological examination gives the diagnosis: anæmia and hysteria.

June 28, 1896.— $\frac{R}{L}$ V = $\frac{6}{9}$ (increased by indifferent glasses to $\frac{6}{6}$). Reads Sn. 1.0 (nothing smaller); ultimately, with blue glasses, Sn. 0.5.

Diplopia for two weeks. Diplopia crossed and due to the complete abolition of the capacity for fusing images. Images 15 *cm* apart for all distances of the test-object, from 1 to 5 *m* [1] when the

[1] This, if the patient's statements are accepted as accurate, is a very remarkable finding. It means that not only was there an *absolute* divergence for distance (divergence beyond parallelism), but that this absolute divergence increased for near points. This is quite different from the increased exophoria for near points common in insufficiency or actual paralysis of convergence. In these cases the divergence is only relative, *i. e.*, the visual axes actually converge, and even converge more and more as the object looked at is approximated, although even so they fail to converge sufficiently. In the case here given, the visual axes were absolutely divergent, so that for an object situated at 5 *m* they diverged more than 2° beyond parallelism, and for an object situated at 1 *m* they diverged as much as 6° beyond parallelism, *i. e.*, instead of making an attempt to converge as the object was approximated, the eyes actually kept diverging farther and farther apart.—TRANSLATOR.]

eyes are directed straight ahead. When the eyes are directed laterally, the images become approximated and ultimately coalesce.

August 5th.—Diplopia persists. Double images, crossed about 15 *cm* apart, when the test-object is 6 *m* distant. Degree of separation of double images remains the same when the eyes are directed laterally, but diminishes as the test-object is approximated to the eyes, being only 2 *cm* where the object is $\frac{1}{2}$ *m* distant. (Relation of the double images entirely different from that observed at the previous examination.)

Neither in the test for double images nor with the cover-test does the eye make any attempt to adjust itself for the object of fixation by changing its position. (Movement of redress absent.) Moreover, a prism of 3°, held base in, unites the double images; held base out, throws them farther apart, *i. e.*, there is complete absence of the natural tendency to fuse double images that are close together. When one eye is covered, the other shows no impairment of motility.

Case 2.—Wachendorf, Anna, aged thirteen. For a short time past has been unable to read continuously, a veil coming over the words. The print often looks double, and sometimes she has diplopia for distance also. Headache and chromatopsia. Neurological examination reveals marked hysteria.

Oct. 18, 1895.—V $\frac{R}{L}$ with −0.75 cyl. = $\frac{6}{6}$. Reads Sn. 0.5, but only when brought very close. On Jan. 16, 1896, V = $\frac{6}{24}$; with −0.75 sph. = $\frac{6}{12}$; reads Sn. 0.6 (not 0.5). Visual field somewhat contracted concentrically; contraction becoming much more marked on repeated examinations as the patient tires. No essential interference with the adaptation when tested in a dark room. Homonymous diplopia, the distance between the double images increasing as the eyes are directed laterally, but in the middle line remaining the same for all degrees of approximation of the test-object (from $\frac{1}{2}$ to 5 *m*).

Feb. 9, 1896.—No improvement in subjective symptoms. In the morning, attacks of vertigo and diplopia for distance and near. In the evening, visual hallucinations. R eye, V = $\frac{6}{18}$; with −0.50 sph. = $\frac{6}{6}$; Sn. 0.5 at 7 to 12 *cm*. L eye, V = $\frac{6}{18}$; with −0.75 sph. = $\frac{6}{6}$; Sn. 0.6 (not 0.5). Homonymous diplopia in the middle line; images very close together when the test-object is $\frac{1}{2}$ *m* distant, but fly apart as the test-object is carried off, being separated 20 *cm* when the latter is 5 *m* distant. For any given distance, the degree of separation of the double images is now

the same, whether the test-object is in the middle line or carried to one side.

Aug. 23, 1896.— $\frac{R}{L}$ E; V = $\frac{6}{6}$; Sn. 0.5. Accommodation normal. No subjective symptoms; no complaint of diplopia. By objective examination, diplopia can be made out to exist only at the extreme limits of the ocular excursions (both lateral and vertical). Double images homonymous, on a level, and but a short distance apart, *i.e.*, the normal relations are restored (the diplopia exhibiting the physiological character) and the patient is cured.

Case 3.—Wachendorf, Willy, aged twelve, brother of Case 2.

Dec. 12, 1895.—Diplopia for some weeks both for distant objects (especially lights) and for print. As a result, he can read but a short time. For 30 *cm* there is a slight relative divergence of 5–6°. R eye, −0.75 sph., V = $\frac{6}{6}$; reads Sn. 0.5 with difficulty. L eye, E. V = $\frac{6}{6}$ readily.

Visual field somewhat contracted concentrically; adaptation-time prolonged. Diplopia in the middle line, crossed for distance, homonymous for near.

Feb. 9, 1896.—R eye, −0.50 cyl., V = $\frac{6}{6}$; convex glasses rejected. L eye, V = $\frac{6}{6}$; with −0.50 cyl., V = $\frac{6}{6}$. Homonymous double images not more than 5 *cm* apart and only apparent when the eyes are turned in the extreme lateral position. No more crossed diplopia.

Case 4.—Behr, Toni, aged twelve. Neurological diagnosis, hystero-neurasthenia. Left pupil more dilated than right. R eye, V = $\frac{6}{24}$; with + 0.50 sph., = $\frac{6}{6}$; for near, Sn. 1.0 (with +0.50 D, Sn. 0.5). L eye, counts fingers held near the eye; with + 1.50 sph, V = $\frac{6}{36}$. By ophthalmoscope, 2 D H each, with some astigmatism in L eye.

For a year has not been able to read well from the blackboard, and by lamplight cannot read at all. Disturbed sleep, visual hallucinations; no special complaint of diplopia.

Visual field shows marked concentric contraction. With red glass diplopia, but the double images change their place and relation repeatedly during the course of the examination. No disturbance of motility of the eyes can be made out.

Aug. 5, 1896. With red glass, diplopia. When the eyes are directed straight ahead, vertical diplopia, the image of the left eye being straight over that of the right. When the eyes are directed up, the double images separate laterally (homonymous diplopia) until they are 25 *cm* apart. When the eyes are directed

down, there is vertical diplopia with the image of the left eye straight below that of the right.

I will not adduce any more histories of this the ordinary form of hysterical disturbance of sight. But I should like to give a characteristic example of another form, marked by suddenly developing muscular contractions.

Böhndel, Clara, eighteen years of age, complains of pain in the eyes, lachrymation, and occasional impairment of sight for distance. When she reads or sews for a long time, objects become black before her eyes, she has muscæ volitantes, and there is a glare of light before her right eye. Occasional micropsia, so that she takes grown-up people for children. Diplopia at times. Constant right-sided headache. Marked vaso-motor neurosis. The trigeminus very sensitive at its points of emergence upon the face; other points on the head very tender to pressure.

Visual acuity reduced. Varying spasm of accommodation.

If the eyes are made to follow the movements of a finger held 50 *cm* in front of them, sometimes the eye that is moved by the externus is suddenly arrested at the middle line, and does not go any farther outwards, while the other eye, that is moving inwards, follows the finger steadily. Thus the picture of a paretic squint due to complete paralysis of an externus is simulated. At other times, the eye that has to move outwards pursues its course in company with the other eye, but does so by jerks and not steadily. But in either case, the disturbance of motility is only present when the movement is an associated one; *i. e.*, if either eye is covered and the other used for fixation, the latter follows the finger both inward and outward without showing any deflection.

If the eyes are made to fix an object placed 30 *cm* in front of them, both suddenly pass into a state of extreme convergence. Then, also, double images can be made out, although the diplopia is not marked, and generally requires a red glass for its recognition.

Unfortunately this case could not be kept under observation longer.

What conception are we to entertain of such a diplopia as that which I have described in these hysterical subjects?

Is it an objective or a subjective symptom? Does it depend upon changes in the centres governing the movements that are affected, or does it originate purely in the imagination? *Does the patient really see double, or does he only imagine that he sees double?* As is the case with the other symptoms of hysteria, the diplopia is a strikingly variable and changeable phenomenon, and without marked effect or influence. Are we to conclude from this that the diplopia exists only in the imagination? I do not believe so. It is quite certain that after a hysterical patient has once acquired double images, he has an obstinate way of holding on to them, and that often, under the influence of the will, pareses or contractures of the muscles are set up, which give rise to different kinds of diplopia. But for all this to occur, he must see double in the first place. In fact, he comes to us complaining that he sees double. And that he actually sees double is proved with absolute certainty by the fact that if we place a red glass before one of his eyes, he at once distinguishes a red and yellow light, and tells how they are placed. This no man who is unaware of the conditions of the test could do if his eyes were acting in a normal manner. *We may, therefore, say with certainty that objective diplopia is present.*

If now we inquire as to the *seat of origin of these disturbances*, we shall have to exclude at once both the peripheral nerves supplying the muscles, and also the nuclei. We do not find any typical isolated paralyses. Nor have I seen any case of ophthalmoplegia interna. It is true, there were cases now and then with unilateral mydriasis associated with slight disturbance of accommodation. But the pupils were never absolutely without reaction, and the disturbance of accommodation was no greater than it would be if due to physical disturbance or simulation.

In hysterical diplopia, in fact, the trouble consists in a *disturbance of the associated and conjugate movements of the eyes.* We have seen in our cases that, while in associated movements there develop disorders of motility and, consequently, diplopia, the movements of each eye by itself, when the other is covered, are performed without difficulty. *The seat of these disturbances we must refer to the cerebral-*

cortex, and to that region of the latter that represents the point of origin of the conscious and willed, *i. e.*, the associate and conjugate movements of the eyes.

The effect of such disturbance of the cerebral cortex upon the associated movements may be twofold, producing either pareses or contractures. Examples of each have been given in the cases described above.

I will briefly summarize the individual characters of physiological and hysterical diplopia.

I.—PHYSIOLOGICAL DIPLOPIA.

1. *In almost all men the presence of double images* in certain directions of the gaze can be demonstrated by suitable tests. Such diplopia *never occurs spontaneously* when the eyes are being used in the natural way.

2. Such diplopia never occurs when the gaze is directed straightforwards, but *only when the eyes are rotated*—and generally only when they are rotated very far—in the different directions.

3. The double images are almost always *homonymous*, and are so too for directions of the gaze both up and down.

4. *Physiological diplopia depends upon the fact* that in the associated lateral movements of the eyes the power of either eye for turning inward exceeds its power of turning outward. Such diplopia occurring in the course of movements up and down depends upon the difference shown by the two eyes in the ability to make excursions in these directions.

II.—HYSTERICAL DIPLOPIA.

1. Hysterical diplopia produces *spontaneous* double vision, which, however, occurs only at times and causes the patient very little trouble.

2. The double images may be *either crossed or homonymous.* In either case, they are present *when the gaze is directed straight forwards.*

3. The phenomena of the diplopia *do not agree with those of paralysis of an eye muscle* due either to a peripheral or a nuclear affection of the nerves.

4. *The relation of the double images is inconstant.* Sepa-

rate examinations, even though made close together, give varying results.

5. The diplopia is to be regarded as due to an *affection of the centre for voluntary associated movements, i. e.*, an affection of some region in the cerebral cortex.

ADDENDUM.

A CORRECTION TO DR. LIEBRECHT'S PAPER.

By Dr. GUILLERY, Cologne.

In the paper just given, Liebrecht describes a "physiological" diplopia which is observed "usually not until the excursion-movements have been carried nearly to the extreme limit of which the eye is capable," and in many cases only when "the patient's attention has been specially directed" to the double images. He further goes on to deny the existence of latent disturbances of the eye muscles, stating that the slightest actual paralysis makes itself evident through the spontaneous development of double images. That is, there is no such thing as a stronger innervation of one or another muscle in the interest of single vision, although the possibility of such innervation is proved by the fact that persons can overcome prisms.

I may leave to other scientists to determine how far they are willing to assent to these and other statements of Liebrecht's, and will simply say a word to defend myself from the imputation of having fallen into the same error that Liebrecht did. He asserts that I repeatedly made out the existence of diplopia in tabetic patients by using the same methods that he did, and he hence is constrained to assume that my statements upon positions of the eye which are associated with special muscular strain have given rise to this mistake. Hence I find it necessary to state that I did not make my examinations in the same way that Liebrecht did, but according to the principles commonly employed in the diagnosis of muscular disturbances. A paralysis obviously is most clearly made out in that direction of the gaze in

which the affected muscle is, when normal, predominantly active; but I did not make the mistake of confounding the symptoms of paresis with those which are produced by simple tiring of the muscles and which evidently are what Liebrecht is talking about. If the examination is made with the eyes in these unusual positions, and if the patient's attention is kept "specially directed," the muscles very soon, of course, get tired, and, as the externus is weaker, it becomes tired first, so that homonymous diplopia is produced. My express statement that I had never found in normal persons the symptoms that I described, Liebrecht characterizes simply as a mistake, instead of drawing from it the proper inference, viz., that my method of examination differed essentially from his own.

A CASE OF CORNEAL CURVATURE THE OPPOSITE OF KERATO-CONUS. (CORRIGIBLE PERIPHERAL MYOPIA, AND CORRIGIBLE CENTRAL HYPEROPIA IN THE SAME EYE).

By Dr. AXENFELD, Marburg.

(*With six figures in the text.*)

Translated by Dr. J. A. Spalding, Portland, Me.

IT is not unusual in the recovery from ulcerations to find a facet of the cornea uniformly flattened, and showing the signs of circumscribed decrease in refraction of the eye. But this *transitory* condition, as well as all of those entirely different irregularities of refraction appearing after old leucomata of the cornea, are hardly to be considered from an optical point of view, and are consequently consigned to the large group of incorrigible irregular astigmatism. Therefore a certain curiosity attaches itself to those cases in which a *permanent* transparent flattening of the cornea was caused by central ulcerations, so that by covering the pupil they produced a partly corrigible hyperopia, and at first made it difficult for the patient in using the eyes to accommodate exclusively according to the central refraction.

In the first case which I reported[1] I failed to call attention to a similar one by Weiss[2] and I will first give a brief account of that instance.

A girl of nineteen, always weak-sighted, but more so for the past four years, complained of monocular polyopia of O D,

[1] *K. M. f. A.*, Feb., 1893.
[2] *Graefe's Archiv*, Band xxi., part 2, p. 187.

which disappeared on using + 6. D, whilst at the same time V was increased from $\frac{1}{200}$ to $\frac{1}{40}$. Weaker convex glasses improved V, but did not remove the polyopia. The ophthalmoscope showed a grayish reflex in the cornea (due not so much to opacification, as to a new curvature), which varied with the degree and manner of illumination. Measurements showed the periphery more curved than the centre. As the eye turned sideways the image decreased in size. The left eye showed similar but more irregular alterations.

The refraction by the ophthalmoscope in the centre of the cornea was + 8 D; toward the periphery less and less, whilst the lateral halves of the optic papilla apparently increased in size, a picture which Weiss attributed to a second and overlying image. In the same way that the patient saw double, so he too saw double. Weiss explains the polyopia in this patient by the peculiar corneal curvature. The patient preferring a weakly hyperopic, or the most highly hyperopic portion of her refraction, figures of dispersion arose in the atropinized, uncorrected eye, and partly covered one another, so that the brighter illumination of various points produced the polyopia. The condition of affairs in the eyes was, in Weiss's opinion, opposite to the so-called kerato-conus.

Although the irregular curvature probably excited the polyopia, yet as the decreased curvature of the cornea was uniform, nothing but a bright circle would arise about the centre of the retina exactly opposite to what the observer saw on looking in. And even if in such an event a central highly hyperopic spot is in this way, so to speak, diminished, that the patient psychically suppressed the sensation permitted by the other portions of the cornea, the only result would be a ring around the centre, as long at least as the highly hyperopic portion was so exactly centred as in Weiss's case. Nor would the dissimilar illumination be affected by convex lenses. We must therefore conclude, either that the circles of diffusion were due to psychical changes, or to alterations in the lens. Nor can I imagine how a gradual flattening of the cornea could produce actual reduplication of the images.

The manner in which self-introspection, even in persons free from hysteria, contributes to the production of monocular diplo-

pia, was lately emphasized to us in the person of a patient who, owing to blindness of his former good eye, was suddenly thrown back on his only remaining eye, which was highly astigmatic (+ 3 D) and cataractous. He asserted that everything seemed double, until he got appropriate cylinders, when single vision was once more enjoyed.

My cases differed from that seen by Weiss in being plainly due to corneal ulceration and in being faceted, and in not representing a *uniform gradual* increase in the radius of curvature from the periphery to the centre, but in a slightly conical curvature to which that of the periphery closely attached itself. But since the original publication, owing to fresh ulceration, the formerly hyperopic spots have become of no use optically.

Having just seen still another case of this sort I beg leave to report it briefly.

Henrietta S., æt. fourteen, had inflamed eyes as a child, but since then her vision has remained the same, except that she suffered three years ago from a catarrhal conjunctivitis which temporarily affected the sight of each eye. There is no apparently visible change in the refractive media of the eyes, and the patient has been regularly at school; she can sew and work like other children, and has never complained of a blur before the eyes.

Both of the eyes show slight conjunctival scars, but nothing else abnormal.

The left eye has some old opacities of the cornea and the ophthalmoscope shows irregular astigmatism.

The right eye exhibits under focal illumination in the centre of the cornea a small punctiform transparent spot as large as the head of a pin, but otherwise than that the cornea is everywhere normal. The ophthalmoscopic mirror, at about 40 *cm* distance, reveals a picture, more or less clearly delineated in Fig. 1.

The ophthalmoscopic determination of the refraction in the erect image shows hyperopia + 5 D, but as we make the observation we see how the refraction alters the moment that we move to one side, whilst with artificial mydriasis it is plain that the hyperopia is limited exclusively to a perfectly circular clear central district of about 5 *mm.* in diameter, whilst the periphery, generally, without any lens or at least without convex lenses, does

not give a clear erect image at all. The bright hyperopic centre is set off against the periphery with its entirely different refraction by a transparent grayish ring, which is very distinct with the plane mirror, weaker by lateral illumination, and depends a great deal on the position of the mirror, the brilliancy of the flame, and so on. If the hyperopic portion is illuminated perpendicularly to its centre the ring is not well defined, only the centre is less bright than the periphery and set off against it. On the contrary by gently rotating the mirror the margins become darker, and if we use a very weak light at a great distance nearly three-quarters seems contoured. This, therefore, is a purely skiascopic and not a constant optical phenomenon.

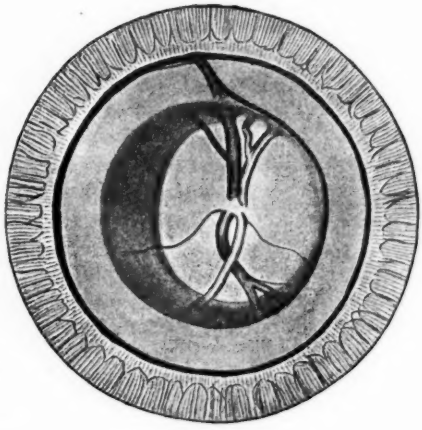

FIG. 1.

Hence whilst from a greater distance on using the mirror to illuminate the eye we see in the centre the erect image corresponding to hyperopia, the *peripheral* portion outside the gray ring is free from similar details. All that we can see there are very fine vessels *moving in the opposite direction*, and seeming to surround the central hyperopic district circularly. The enlargement of any vessel in the periphery is less than in the central portion. If we grasp the image of any vessel so as to see it running over from the peripheral portion to the central, then there is a change in its size and movements according to which zone we for the time being use.

Ophthalmoscopic determination of the refraction of the peripheral portion is difficult, but skiascopy shows a myopia of − 8 D.

Therefore, with a moderately dilated pupil, without mydriasis, there is a central hyperopia of + 5 D and a peripheral myopia of − 8 D, whilst the cause of this great difference of refraction lies for the most part in the cornea.

In comparison with the *left* cornea, the right shows on profile view *flatter in the centre*, and the anterior chamber is shallower.

The rings of Hirschberg's keratoscope in the right eye are broader in the centre than in the periphery. If the figure falls on the intermediate zone between the hyperopic and myopic portions, the appearances are exactly opposite to those of kerato-conus, the inner portions being broader, the peripheral narrower.

Examinations with the keratoscope as well as with the ophthalmometer show that the transition from the flat centre to the more curved periphery is not as it seems to the naked eye a *gradual* one, but that in the marginal portion of the centre, in contrast with the periphery, the radii of curvature rapidly change.

Testing the vision without mydriasis shows O D, V $\frac{6}{9}$; all glasses diminish the vision. O S, about the same amounts. Starting with the idea that with the back to the light during the tests for vision, some portion of the cornea was employed that lay outside the strongly hyperopic portion, the cornea was illuminated with a lens as in lateral illumination, so that the pupil was a good deal contracted; but even then convex glasses were not accepted. There was, therefore, a latent hyperopia, discoverable only by the use of the mirror.

Under atropine mydriasis, the ophthalmoscope shows O D centre H + 5 D, peripherally by skiascopy M − 7 D.

Vision, without glasses, no letters at 6 M, with + 5 D $\frac{6}{18}$ to $\frac{6}{12}$. Weak convexes make the vision worse; but *concave* − 7 gives $\frac{6}{18}$.

The patient reads without lenses, Schw. 3 at 13 *cm*, and later with + 12 the same letters at the same distance. With the strong convex lenses she says that reading is easier and the letters look larger.

The patient is consequently, for both far and near, as well hyperopic as myopic in the same eye, and both states of refraction can be corrected.

Repeated tests and many observations during four days, whilst the atropine-mydriasis was maintained, all showed substantially the same results.

This case, in which hyperopia and myopia existed in one and the same eye, is an excellent example of an eye with multiple foci, corresponding to a lens of double focus (Fig 2).

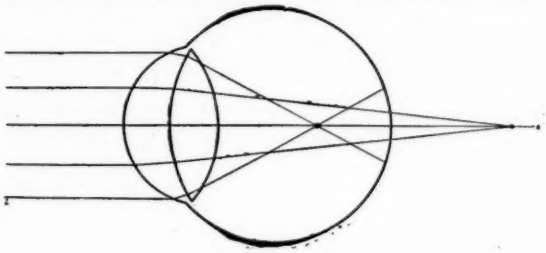

FIG. 2.

Having this title, it belongs to the same class as kerato-conus and lenti-conus, for which L. Müller proposes the name of "Lens with double focus."[1] Under this title there have also been included cases in which the centre was hyperopic and the periphery myopic; but more often, as in kerato-conus, the centre refracts the more. Hence there has been described more often in this condition of affairs a different skiascopic shadow-play, peripherally and centrally, and the simultaneous appearance of erect and inverted details; but never any such possible correction of the different refracting portions of the cornea. But Weiss's case, and cases of kerato-conus, resemble mine in so far as that other glasses than the best correcting ones improve the sight a little. It is hardly worth mentioning that the condition of regular astigmatism in which people see a trifle better with weak convex or concave lenses has no connection with this present case.

The patient has a wonderful capacity of exercising at will either the myopic periphery or the hyperopic centre of the eye, or even the intermediate zone approaching emmetropia, without being in the least disconcerted by the images of the other portions. She also has without a lens a vision of $\frac{6}{18}$, which is only possible with the emmetropic or slightly hyperopic portions.

If we wish to represent *mathematically* a gradual flattening of the cornea, it most resembles a flat rotation-ellipsoid

[1] *K. M. f. A.*, June, 1894.

in which the rotation has taken place about the short axis. Weiss's case is the only pure example so far described. Yet it is remarkable that the difference in refraction is so small in comparison with the marked and rapid difference in the values of the radii of curvature, that we must assume that a partial compensation has occurred owing to other optical conditions.

My case also showed a moderately uniform increase of curvature toward the periphery, but the transition from hyperopia to myopia is somewhat more rapid. Moreover, the peripheral myopia, in contrast with the central hyperopia, corresponds very well with the conditions which we must imagine in the case of a flat rotation-ellipsoid nearly bisected. So that this case stands between that of Weiss and others before described by me, which may have been confounded with the flat rotation-ellipsoid. But, mathematically, the corneal curvature in both of our cases is not opposed to kerato-conus, but only to the physiological ellipticity of the cornea. Also in kerato-conus, with its hyperbolic curvature, the sharply curved centre flattens more rapidly toward the periphery, and, therefore, cases of faceted flattening are more in correspondence with this condition of things.

In now accepting the term, "opposed to kerato-conus," I simply mean that such cases of central flattening are opposed to it in the chief symptom, namely, that the centre refracts less than the periphery. And in this sense the name is a proper collective name, because it touches the essence of the functional anomaly, and embraces the alterations in question amongst "eyes with a double focus." We may also be here reminded that a flat rotation-ellipsoid offers better chances for correction by spherical lenses than another rotation-ellipsoid with longer axis of revolution.

It is interesting at this point to compare the relations at the poles of one and the same ellipse. Thus, Fig. 3 represents an ellipsoid rotated about its short axis B B'. At B the radius of curvature is $\rho b = 9$ *mm.* If I now imagine to be excised about the pole a symmetrical segment of the surface of 10 *mm* linear diameter, then the radius of curvature in C and C' will be 7 *mm.*

Then we have by reckoning the semi-axes of the ellipsoidal section :

$$O\,A = a = 7.35\ mm,$$
$$O\,B = b = 6.0\ mm.$$

The points C and C′ have a distance—

from O B = 5.0 *mm*,

from O A = 4.4 *mm*.

Therefore the curvature increases from B = 0.1111 to C, where it amounts to 0.1469.

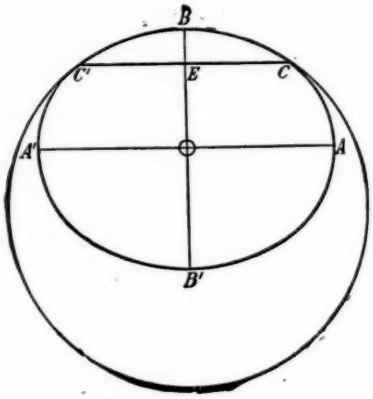

Fig. 3.

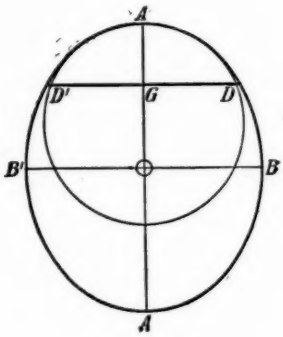

Fig. 4.

Note.—The points C and C′ in the figures are erroneously in contact with the circle, whilst in reality, and as shown in the original drawing, they are uniformly at some distance from the same. So, too, in Fig. 4, the distance between D and D′ is too small.

If I now assume that from an ellipsoid of the same axes, but rotated on the *long* axis, we remove a cornea, or, in other words, a piece 10 *mm* in diameter, that is to say, D to D′, we have :

Fig. 4.—The radius of curvature at A = $\rho a = 4.9$; at D (where G D = D′ G = 5.0, G = 4.06), $\rho a = 7.66$; *i.e.*, the curvature $\frac{1}{\rho}$ decreases from the point A $\left(\frac{1}{\rho a}\right)$ to the point D $\left(\frac{1}{\rho a}\right) = 0.1304$

Hence in the first case the curvature increases about 0.0358 and in the second 0.0737, that is, twice as much.

In regard to the *diagnosis*, I would emphasize the utility of the plane mirror and of skiascopy, as long since recommended for all forms of irregular astigmatism by Knapp, at the Heidelberg Congress, in 1864. If the flattening is gradual the centre will appear slightly darker, owing to the reduced concentration of the passing rays. In faceted rupture of continuity this does not occur within the flattened surface. On the contrary, with skiascopy, or decentred position of the mirror, a gray ring appears on the margin, as well as in gradual flattening in those portions where the hyperopia passes over into myopia.

The appearances in kerato-conus are generally opposite to these, the bright sectors appearing with their bases outward, according to the position of the mirror. In other cases the strongly myopic centre is distinguished from the neighborhood by a very dark grayish ring. The latter is almost always constant, but is variously strengthened or diminished in tint, and corresponds in its origin to the dark margin of the lens when illuminated. Knapp also recommends us to watch how the light falls on the iris through spots that are abnormally curved. In case of bulging we see a small focus with darker contour; with flattening, a small, darker spot with a brighter contour, because the flat portions concentrate the light less strongly. But this iris-phenomenon is only valuable in small circumscribed variations in the curvature.

Instead of using the common keratoscopic ring-shaped discs for examining these forms of corneal irregularity, as well as in cases of irregular astigmatism, I have had constructed of *papier maché* a concave hollow cylinder, upon the surface of which I have had painted long, uniform, black and white stripes. Owing to the concavity of this hollow cylinder all of the various portions of the longitudinal stripes are approximately at equal distances from the surface of the cornea, whilst plane discs at the usual distances of examination give disproportionally larger reflected images for the centre than for the periphery. With such a curved apparatus as this we can cast a striped figure across the whole cornea, and in the case which I have here re-

ported it was interesting to see how, toward the centre, the stripes bulged as in Figure 5, whilst in the cases of kera-

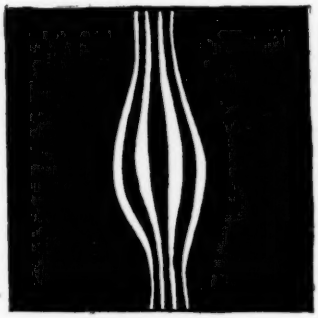

FIG. 5.

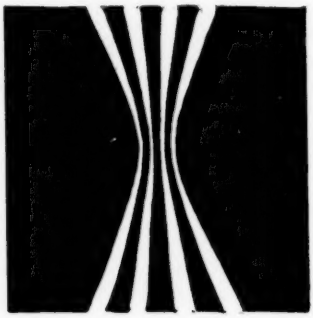

FIG. 6.

toconus they contracted towards the centre, as shown in Figure 6.

The *ætiology* of the undoubted flattening of the cornea is difficult to explain in our case. It is most probable that inflammation in youth was at fault, but that the flattened portion remained always slightly opaque, whilst the little spot in the centre cleared up to almost perfect transparence, as can only be expected in youthful patients, owing to the capacity for regeneration so active in the early years of life.

I would here mention that similar cases might easily be regarded as ones of simple hyperopia, and so their peculiarity be overlooked, as actually happened in my case, which was not precisely determined until after the most careful and prolonged examination with and without mydriasis.

The *extraordinary transparence* of the hyperopic corneal district was of importance in this case. In the experiments that were made at the time, it was easy, through a small concave lens (3.5 *mm* in diameter), even when it did not actually cover the pupil, to accommodate sharply, and then again through the unarmed emmetropic periphery, so long as the glass remained transparent. It only became difficult when by artificial opacity the vision through the little lens

became greatly reduced; then, accommodation through the lens alone became very difficult.

Finally, we may urge that this rare and indeed characteristic picture of disease of corneal curvature opposed to kerato-conus ought to be removed from the group of irregular astigmatism and studied in and by itself.

A CASE OF TRAUMATIC PULSATING EXOPHTHALMUS WITH AUTOPSY.

By Dr. O. STUELP, Strasburg.

Translated by Dr. J. A. Spalding, Portland, Me.

(*With Text-Plate VIII.*)

ALTHOUGH the morbid picture of the so-called pulsating exophthalmus has long been well known and carefully described by Sattler,[1] I have no hesitation in offering the appended case for publication, because it is of such extraordinary interest from many points of view.

On the 18th of August, 1894, Johann D., æt. forty, was brought to the eye clinic with the statement that he had been treated for some time at the General Hospital, but seemed to stand in need of special treatment, or even an operation, for some injury to the left eye. We were unable to discover the cause of the injury, because at the time of his reception the patient was in a somnolent and apparently a very serious condition. But ordinary inspection showed facial paralysis on the right side, and excessively œdematous swelling of the entire region of the left eye, together with well marked protrusion of the ball. The skin of the eyelids was hot and very red and traversed with numerous hard and swollen veins. The conjunctiva was much swollen, injected, and chemotic so that the entire upper fold beneath the upper lid which was in a state of complete ptosis projected forward as a thick, red, and tumefied wall of tissue. The lower lid was totally everted and on its inner third was an ulcer very hard to the touch and covered with crusts. The globe was quite immovable in any direction, the cornea hazy, the pupil enlarged and irresponsive,

[1] *Graefe-Saemisch*, vi., p. 245.

whilst the refracting media being very clear, revealed with the aid of the ophthalmoscope the picture of well marked congestion of the disc with tortuous veins and numerous hemorrhages in the retina. Vision, Fingers at 2 *m.* Any pressure on the globe or its immediate neighborhood produced excruciating pain.

At a consultation of the staff, although some were of the opinion that there might be orbital cellulitis, the majority were of the opinion that the case was one of traumatic pulsating exophthalmus.

The history of the patient, as taken at the entrance into the General Hospital, was, that about four weeks before, he had fallen down stairs and in falling had struck the occiput with great force. He suffered from immediate hemorrhage from the nose and ears, then became unconscious, and after a few days of apparent improvement the left eye began to protrude from the orbit, accompanied with violent pain in that cavity and the entire left side of the head, which, later, increased, if possible, in excruciating intensity. At the same time the patient complained in the left side of the head of a constant rushing and roaring sound which, at times, was interrupted with hissing and throbbing noises like those of a locomotive when steam is escaping.

A very careful examination failed to show anywhere about the region of the eye, except over a very minute zone between the globe and the nasal portion of the supra-orbital margin any traces of pulsating movements. But, at the spot designated, there was visible to the eye a slight rhythmical elevation and depression. So too, the finger tip, if pressed deeply into the orbit could distinctly perceive a pulsation, synchronous with the radial pulse, but ceasing promptly or reviving accurately on compression or relaxation of the left common carotid artery.

The stethoscope brought out on the entire left side of the skull a uniform roaring, murmuring sound like that of a distant waterfall, with occasional mixture of higher scratching or even whistling noises, and against the pulsating spot in the orbit we could perceive at intervals a systolic murmur. But all of these sounds ceased, or recurred, on compression or relaxation of the left common carotid as the pulsations had done before.

All of these symptoms led us to make the diagnosis of pulsating exophthalmus, probably due to rupture of the internal carotid in the cavernous sinus as a result of the traumatic fracture of the base of the skull.

Additionally, the patient showed diminution of the sensibility of the left half of the forehead, and increasing somnolence. There was nothing abnormal in either auditory canal.

The patient being sufficiently awakened to understand his condition, consented to an operation, which we decided should be a ligation of the left common carotid. But as his condition soon grew worse the operation was postponed, and simple compression of the artery was tried instead. This, however, only increased the pain and the protrusion of the eyeball and was soon omitted. Two days later the patient died gradually, with symptoms of rapid pulse and respiration and gradually rising temperature.

The autopsy made 18 hours after death showed the following condition of affairs:

Fracture of the base of the skull, large traumatic softening in the left hemisphere, rupture of the internal carotid in the cavernous sinus.

There is well marked œdema around the left eye, and yellowish discoloration of the skin. The longitudinal sinus has only fluid blood. The pia is everywhere remarkably dry, the gyri thin and flattened, the vessels moderately injected, the carotids thin-walled, without a trace of thickening.

The lower surfaces of the temporal and frontal lobes are very grayish-red in comparison with those of the right side, and the pial vessels are injected and tortuous. The corpus callosum is soft, the left lateral ventricle dilated, and the left corpus striatum red and softened in comparison with the right. Beneath the softened cavity is a second large cavity filled with fresh blood-clots, and occupying the entire frontal lobe, so that of normal cerebral substance there is hardly a thickness of more than 5 *mm.*

The posterior portion of the ganglia on the left side is yellow, softened, and hollow to the depth of 2 *cm.* On opening this cavity it communicates with other passages leading to the centrum semiovale.

The entire softening-cavity in the left hemisphere seems to have no communication, however, with the lateral ventricle.

This entire region on the right side is normal.

The pons has a small hemorrhage, and is flattened.

The right middle cranial fossa contains, just beneath the dura, a membrane originating from a former hemorrhage, and in front of the same in the right middle cranial fossa is a very narrow but

distinct fissure extending to the anastomosis between the squamous portion of the temporal bone and the sphenoid, and then stretching along into the parietal bone where it terminates in its centre in a T-shaped crack.

Careful preparation of the region about the left cavernous sinus shows that the posterior portion is occupied with a blood clot, attached firmly to its walls and of a grayish color and firm consistency. In front, this thrombus extends to the posterior wall of the carotid, whilst that portion in front of the carotid contains only fluid blood. This part of the sinus is much dilated, as are also the ophthalmic veins.

The wall of the carotid which is not turned toward this portion of the sinus contains a large opening with smooth margins, and extending through all of the arterial coats so that there is an open communication between the cavity of the carotid and the anterior portion of the sinus. But this artery, otherwise, is perfectly healthy and free from blood.

The ocular muscles on the left side exhibit well-marked hemorrhagic infiltration.

The rest of the body offers nothing of interest.

Sattler's list of cases of pulsating exophthalmus numbers one hundred and six, fifty-seven of which were of traumatic origin. And since 1880 I find twenty-three additional cases of the same nature, so that we now have a list of ninety cases of traumatic origin so far published.[1]

Amongst these eighty cases in which a diagnosis was made of rupture of the internal carotid in the sinus cavernosus as the result of an injury, there were autopsies in six.[2]

Only four of these cases showed at the autopsy a rupture of the aneurismal carotid into the sinus cavernosus, whilst in Blessig's case a rupture could not be positively ascertained, and in Bauman's patient, in whom (after the blow of a fist against the temple) all the symptoms of an orbital aneurism became developed, there was discovered, instead

[1] A bibliography of cases up to the year 1887 can be found in a paper by Nieden in *Archiv f. Augenhlkde*, xvii., p. 275, and later cases have been reported by Rossander, *Nagel's Jahresbericht*, 1888, p. 526; Poirier, *Arch. Gén. de Méd.*, 1890, p. 513; LeFort, *Rev. de Chirurgie*, 1890, p. 368; Kalt, *Semaine Méd.*, 1891, p. 336; Mueller, *Inaug. Dissert.*, Halle, 1891; Pulvermacher, *C. f. A.*, 1892, p. 329; Reeve, *Transac. American Ophthal. Soc.*, 1893.

[2] All of these can be found in *Graefe-Saemisch*, Band vi., p. 847 *et seq.*

of the expected ruptured carotid-aneurism, nothing but a thrombosis of the cavernous, circular, transverse, and petrosal sinuses, and of the left ophthalmic vein.

Our case then would be the fifth in which a rupture of the internal carotid, due to traumatism, could be distinctly shown by autopsy to be the cause of a pulsating exophthalmus.

The symptoms observed during the patient's life could be explained in this way: The muscular paralysis of the left eye and the anæsthesia of the left half of the forehead were probably due to compression of the nerves for the ocular muscles, as well as of the superior branch of the trigeminus in the sinus cavernosus. The right facial paralysis could be regarded, possibly, as the consequence of some alteration of the nerve foramen at the base of the skull by the direct fracture. I should, however, prefer to make the hemorrhages in the pons and rhomboidal sinus responsible for the paralysis, since, on the one hand, the line of fracture was rather distant from the exit of the facial nerve, whilst, on the other, the escape of the auditory nerve from injury favors a basal cause.

There is no doubt that the tremor and convulsions in the right arm, as well as the absence of the right-sided belly and cremaster reflex, were due to the focus of softening in the left hemisphere. On the contrary, it is very remarkable that the colossal destruction of the brain substance, which had even encroached upon a portion of the fibres of the corona radiata, failed to produce paralytic symptoms in the extremities, and, on the whole, had produced so few symptoms that the result of the autopsy was totally surprising, since so extensive lesions have never before been discovered at any of the autopsies published.

The ancient large focus of softening is most probably the direct consequence of the rupture of the internal carotid occurring directly after the fracture of the skull, and persisting without noteworthy symptoms until secondary hemorrhage produced death.

After all these considerations we must make some limitations, hereafter, so far as the prognosis is concerned, in these

and similar cases. For although, according to Sattler, the prognosis, so far as life is concerned, is not so very unfavorable (for I find but nine fatal cases amongst the eighty before referred to, that is to say, but eleven per cent.), yet our case demands careful consideration in diagnosis, and increases the number of those cases in which the patient, after apparently withstanding the results of a fracture of the base of the skull, and being only affected with the symptoms of rupture of the carotid, suddenly succumbs to a secondary hemorrhage.

Finally, our case gives us opportunity to make some remarks on the indications for ligation of the common carotid.

Generally speaking, this method of treatment even in traumatic pulsating exophthalmus has been frequently employed and has had many successful exemplifications of its great value.

There have been so far fifty-four cases recorded, amongst the eighty total which I have been able to collect, and of these, thirty were successful, (in a few instances only after ligation of both common carotids,) fifty-five per cent.; fifteen were of doubtful value, twenty-seven per cent.; and nine (eighteen per cent.) were failures.

The remaining twenty-six cases were treated without the radical operation, partly with internal medication, partly with digital compression, ergotine injections, electro-puncture, etc., and of these, ten were successful, thirty-eight per cent.; nine doubtful, thirty-five per cent.; and seven remained entirely unchanged, twenty-seven per cent.

Of the latter twenty-six, two declined any treatment whatsoever, and of these one underwent a spontaneous cure and one a rapid and painful death.

Of course a list of eighty cases in all, is too small on which to base a correct and final opinion in regard to the value of various methods of treatment in traumatic pulsating exophthalmus. This much, however, we can see, that despite the fact that the failure to operate at all exhibits by comparison with the operation by no means poor results, yet ligation of the carotid offers proportionally the greatest benefit. But our case teaches us that, before this operation

is suggested, we should make a most searching examination for any possible grosser cerebral lesion, and if there is the least suspicion that such exists, the patient should be warned against the operation.

If our patient had appeared at an early date, and before any observation of the symptoms of somnolence, right facial paralysis, and so on, all of which suggested a focus of softening, (tremor, cramps in the right arm, and the absence of belly and cremaster reflex), he would probably have been subjected to the serious operation of ligation of the left common carotid, with the result that in all human probability he would have died on the operating table whilst under the influence of the anæsthetic, or if he had survived the narcosis and the operation he would, owing to the ligation of the artery, pretty surely have succumbed to the sudden disturbances of nutrition which the large focus and cavity of softening would have unfavorably influenced.

ABSTRACTS OF THE PAPERS IN VOLUME XXX. OF THE GERMAN EDITION NOT PREVIOUSLY TRANSLATED.

(*Concluded.*)

By Dr. WARD A. HOLDEN.

XV.—Blindness Following Attempts at Suicide by Shooting.

By Dr. E. GOTTBERG.

In the *Berliner klinische Wochenschrift* No. 38, 1891, Hirschberg published a paper entitled "The Eye and the Revolver." From his statistics it appeared that only half of those who shoot themselves in the temple die, but one third of the survivors become blind in one eye or both.

Prof. Weiss has seen three cases of this injury, followed by total blindness in both eyes. The histories are as follows.

Case 1.—G. S., twenty-four, shot himself with a revolver in the left temple September 22, 1882. The wound of entry lay 5 *cm* outward from the left outer commissure, on a level with the upper orbital margin. The ball went through both orbits and passed out through the right upper lid, destroying the right eye almost entirely. The left eye was completely blind, with exophthalmus, narrow anterior chamber, iridoplegia, and but slight mobility of the globe. The vitreous was clear, but the fundus was occupied in its central portion by a large hemorrhage. In the periphery of the fundus the normal reflex was seen, and the vessels were well filled. A year later the site of the hemorrhage was represented by a large white patch.

This patch corresponded to that seen in one of Cohn's cases: "The disc could not be found. The posterior pole of the eye was occupied by a glistening grayish-white patch 8 P D in diameter; no vessels were seen." Waldeyer examined Cohn's case microscopically and reported chronic chorio-retinitis with the formation of a plastic exudation on the inner surface of the retina, and simultaneous fibrous degeneration of the retina and atrophy of the choroid.

CASE 2.—J. E., twenty-eight, shot himself in the right temple, April 12, 1896. The wound of entry lay 3.5 *cm* outward from the outer margin of the right orbit, and somewhat higher.

The right upper lid drooped. The ball was prominent. The pupils were wide and did not respond to the light. The patient was completely blind, but the fundi were normal. When examined later the mobility of the eye was found to be much diminished and the discs were pale.

CASE 3.—K. S., forty-two, shot himself in the right temple August 3, 1894. The ball passed through the right orbit and the left eyeball, destroying the latter. Right: marked exophthalmus, sub-conjunctival hemorrhage, dilated and irresponsive pupil, lateral mobility of ball much reduced. Complete blindness. Many hemorrhages in the fundus, one overlapping the disc. Later history unknown.

In this case it must be supposed that the right optic nerve was severed by the shot. Whether suturing would be of any service in such cases is uncertain. The operation has not been done on man, although Professor Weiss has convinced himself, by experiments on animals, of its feasibility.

In connection with these three cases of bilateral blindness I would report one of unilateral blindness, with the kind permission of Prof. Nagel.

E. M., a student aged twenty-two, shot himself in the right temple in 1874. He was examined some time after the injury. The wound of entry was some 2 *cm* outward from the outer commissure and slightly higher. The right eye at once lost its sight, and there were dilatation and immobility of the pupil, and ptosis of the upper lid. Hearing remained poor in the right ear. The left eye preserved its sight. Later the mobility of the right eye

was diminished, the disc was pale, and there were remains of hemorrhages in the retina.

From these reports it appears that the lesion of the eye from shot wounds may be of various sorts. The severity depends upon the point of injury. When the eyeball is grazed, the consequences are less severe than after injury of the nerve, hemorrhages taking place in the vitreous and coats of the eye, and in some cases the coats themselves being torn. Injuries of the nerve, whether the latter is completely divided or not, always end in atrophy.

The optic nerve may be struck in or behind the orbit, or it may be injured indirectly by detached splinters of bone. In many cases there may be a fracture of the base, which extends into the optic canal and causes hemorrhage into the intervaginal space. Encephalitis or meningitis in consequence of the fracture causes papillitis and atrophy of the nerves. The optic nerve itself need not be injured to cause blindness after shooting in the temple. Blindness after fracture of the base is unilateral or is associated with hemianopsia of the other eye. Michel believes that in these cases the cause is rather a callus-formation in the optic canal, than a hemorrhage into the sheaths. The callus would exercise a steady pressure upon the nerve; the amount of blood, however, would not be sufficient to completely interrupt conduction.

The paper concludes with abstracts of 16 similar cases from the literature.

XVIII.—Experimental Investigations on the Infection of Penetrating Wounds from the Infected Conjunctival Sac, etc.

By Dr. LUDWIG BACH, Würzburg.

While in surgery the antiseptic treatment of wounds has given place generally to the aseptic, the change has been slower in the domain of ophthalmology. Not only are the familiar antiseptics recommended again from time to time, but it is thought necessary to introduce new ones. In recent years a number of investigations have been made which

show what effect antisepsis has on the bacterial contents of the conjunctival sac and what effect asepsis has; the advantages being in favor of the latter. In former investigations I have found that a mechanical cleansing of the conjunctiva and lid margin and simultaneous irrigation with an indifferent liquid have far more effect in diminishing the number of germs present than irrigation with the best antiseptics. I may add that I have not obtained a greater percentage of sterile conjunctivas by using bichloride 1:5000 than by using an indifferent salt solution, the mechanical washing away of the germ being the main thing.

In preparing an eye for cataract extraction I cleanse the lid margin and conjunctiva and then have the patient wink a number of times for the purpose of forcing the germs toward the nose. After the speculum is introduced, I wash out the conjunctival sac again and cleanse particularly, by means of a sterile pledget with simultaneous irrigation, the place where the section is to be made. Every instrument and sponge that is to touch the eye is previously sterilized. In hundreds of eye operations, among them 200 linear extractions, suppuration has not occurred in a single case, though no antiseptics have been used.

I undertook to find out the degree of danger of infection to penetrating wounds made with a sterile knife when the conjunctival sac contains innumerable pyogenic germs. In fifty rabbits whose conjunctival sacs were inoculated with cultures of staphylococcus, a penetrating wound 6–8 *mm* long was made in the limbus with a sterilized curved lance. Of 25 cases in which the inoculation was made before the operation, infection took place in 5, the eye being lost from panophthalmitis in 3, and the suppuration ceasing in 2.

Of 25 cases inoculated after the operation infection took place in 2, one eye being lost from panophthalmitis and the other recovering.

In 10 further experiments, an infected lance being used to make the section, the eye was lost from panophthalmitis in 9, infection not taking place in 1. Those latter results were quite in accord with the results obtained by Knapp in similar experiments.

To prevent the infection of wounds the chief care should be the sterilizing of the instruments. If a wound is made at a point free from germs, with a sterile knife, there is but little danger of later infection from the sac.

XIX. — Subconjunctival Injections of Bichloride. A Reply to Dr. Mellinger and Dr. Gutmann.

By Dr. A. DARIER, Paris.

Mellinger has at times observed extensive necrosis of the conjunctiva after subconjunctival injections of bichloride. Hence he concludes that the bichloride uniformly causes a severe irritation, leading to fibrinous adhesions between con junctiva and sclera. Similar reports are heard from various sources, and I have seen such cases myself. They occur when the injections are made too near the limbus, or too deep under the conjunctiva, where Tenon's capsule has its attachment to the sclera. I have, therefore, recommended that the injections be made as far as possible from the cornea, and, as far as possible, tangential to the ball, in order to avoid Tenon's capsule and the episcleral tissue. The severe pain which unfortunately too often follows the injection can only be explained hypothetically, but it appears to me most probable that in such cases a nerve fibre has been touched by the needle. It may happen in the same person that one injection is painless, and the next, the same liquid being used, causes severe pain, lasting all day. The pain does not depend upon the nature of the liquid, for I have observed it after the injection of distilled water. Thus one patient, who had borne a number of bichloride injections well, found injection of distilled water much more painful.

It is true, however, that bichloride 1:1000 is more irritating than bichloride 1:5000; but the pain from the former solution is bearable, and may be lessened by adding cocaine 1 %, though when cocaine is employed, a mercurial such as the cyanide should be used, which does not precipitate cocaine. The solution must be prepared with sterilized, distilled water without the addition of alcohol.

The fibrinous adhesions between conjunctiva and sclera,

mentioned by Mellinger, probably arise under the same conditions as does the necrosis of the conjunctiva which he speaks of. There is now under my care a young man who has received 125 injections of bichloride, yet his conjunctiva is normal and readily absorbs the liquid. The technique of subconjunctival injections has been described at length in my paper in the *Annal. d'Oculistique*, December, 1894.

Mellinger says in his paper that the action of subconjunctival injections is merely in altering the processes of absorption; probably the lymph current is accelerated and the carrying off of infectious matters facilitated. This is a very plausible explanation. Further, Mellinger declares that injections of salt have the same favorable effects as injections of bichloride, and lack the objectionable results of the latter. When he has furnished enough convincing observations to support this statement, I shall congratulate him on his simplification of local ocular therapy. At any rate, Mellinger has obtained results from injections of salt. I have myself used salt solutions, but without getting results equal to those following the use of bichloride.

There follow histories of cases in which the author has compared the results after using salt with those after using bichloride, to the advantage of the latter. The author also analyzes the case-histories given by Mellinger, and shows that the injections probably were of considerable service, although Mellinger considered the beneficial effects of the injections slight and thought that they sometimes did harm.

XX.—Two Cases of Malignant Glaucoma.

By Prof. E. ADAMÜK, Kasan.

Case 1.—G. P., aged thirty-four, consulted me after having lost the sight of his right eye. When examined, the eye was hard, the pupil dilated, the disc cupped, V = o, but there were no hemorrhages or other changes in the choroid or retina. A dull pain in this eye some weeks before caused him to cover the other eye, when he found that the right eye was blind. An iridectomy was done, and the eye did well until the fourth day, when the lips of the wound were found open and the anterior chamber flat and containing blood. The wound then closed and opened again re-

peatedly. The cut edges of the iris prolapsed and were abscinded; and, finally, after several weeks a flat scar was obtained.

Some time later, the sight of the other eye began to be periodically blurred and gradually reduced. In my absence an operation was delayed, and when finally performed by a competent operator, it was followed by iritis and slow and uneven healing of the wound and eventual complete loss of sight.

In many glaucoma patients I have seen a tedious healing with slow restoration of the anterior chamber, but the disposition to a repeated reopening of the wound is a special characteristic of malignant glaucoma.

CASE 2.—S. K., a peasant woman of fifty-two, came to my clinic with an absolute non-inflammatory glaucoma in the left eye, and with a beginning glaucoma in the right, which reduced the vision to $\frac{20}{40}$. Tension was increased in both, but there were no signs of inflammation and no hemorrhages. An iridectomy was done in each eye, followed by tedious hemorrhage into the anterior chambers. The following day and afterwards there was considerable pain. Iritis developed and the eyes remained hard, sight in the previously good eye being much reduced. A second iridectomy in each eye was followed by similar hemorrhage and iritis.

The question arises whether in cases of malignant glaucoma it would not be better to do a sclerotomy on the second eye. But when one remembers how slowly wounds in such eyes heal, it seems likely that even sclerotomy with its delayed healing would be followed by bad results. It should, however, be definitely settled that when the results of an iridectomy in one eye are a delayed healing and a decrease in vision, iridectomy should not be done in the second eye, but operative procedures should be limited to a small sclerotomy or to paracentesis of the cornea.

XXI.—THE BACTERIA OF THE CONJUNCTIVAL SAC IN THE HEALTHY EYE.

BY DR. S. LACHOWICZ, WILNA.

A platinum loop, after being sterilized in a flame, was passed three times over the conjunctiva of the lower lid in a direction from out inward, and the liquid so obtained was

inoculated on an inclined surface of agar in a test tube. Any colonies developing on the agar were inoculated on gelatine. The healthy eyes of 32 persons were thus tested. In 31 per cent. bacteria were found, in 69 per cent. they were wanting. Only a fourth of the persons whose sacs contained bacteria had them in both eyes. My findings of cocci agree with those of earlier observers, the staphylococcus pyogenes albus appearing in the four eyes of two persons, the micrococcus candidans in two eyes of two persons, the streptococcus pyogenes in one eye, the sarcina lutea in two eyes of two persons, the micrococcus coronatus in four eyes of two persons. Of bacilli I found a club-shaped rod (bacillus sporiferus, Bujwid) in one eye, the bacillus fluorescens putridus in one eye, the bacillus granulosus (the bacillus xerosis conjunctivæ of many authors) in three eyes of two persons, and a new bacillus in one eye.

Nearly all of these micro-organisms are such as are found in air or in water, and only the staphylococcus pyogenes albus and the streptococcus pyogenes are ever pathogenic.

My own conjunctiva, which, after three examinations, was found to be sterile, was inoculated in turn with pure cultures of each of the micro-organisms found in the other eyes, excepting the streptococcus pyogenes, the xerosis bacillus, and the sarcina lutea, of which cultures were not at hand when the inoculations were made. None of these caused the slightest irritation, and every one disappeared from the conjunctiva in the course of a few days, although the length of time they remained varied with the different micro-organisms.

XXII.—On the Mechanism of Accommodation.

By Prof. C. SCHWEIGGER, Berlin.

In the extraction of senile cataract by the flap operation downward, it occasionally happens that an unintentional innervation of the ocular muscles, immediately after the section is completed, forces the lens, with its capsule unruptured, out of the eye. The lens then ordinarily preserves its senile, flattened form, but at times I have observed that

with liquefaction of the cortex the extruded lens in its intact capsule exhibits the round form which is found post mortem in the eyes of the young. Since the liquefied cortex can have no particular elasticity, this fact can be explained only as being due to the elasticity of the lens capsule, and it is also conceivable that an elastic membrane filled with soft contents should naturally take on a spherical shape when this is not prevented by a counter-traction. The greater thickness of the anterior capsule thus explains also its greater curvature in accommodation. The evident change in the form of the lens in accommodation is usually explained as being due to the effort of the lens substance to assume a spherical shape. This view, doubtless, proceeds from the idea of the "musculus crystallinus," held by the older anatomists (Loewenhoek, Pemberton, and also Thomas Young), yet I believe, on the ground of the preceding observation, that the elasticity of the lens capsule alone is sufficient to produce the change in shape, while the lens proper plays a more passive rôle.

So long as the lens is young and soft, and offers only a slight resistance to a change in shape, the elasticity of the capsule predominates, but when the lens becomes gradually harder, it offers a constantly increasing resistance. If then the cortex becomes liquefied in senile cataract, the elasticity of the capsule again predominates, and it approaches the spherical shape as soon as it ceases to be held tense by the zonula.

XXIV.—The Anatomical Findings in Spontaneous Connective-Tissue New Formation in the Vitreous (so-called Retinitis Proliferans).

By Dr. RUDOLF DENIG.

The patient from whom the eye was taken at the autopsy died at the age of sixty-two. Two days before death I found in both eyes marked atheroma of the retinal vessels, numerous hemorrhages, and, in the right eye, the well-known picture of retinitis proliferans. The white bands, with their elevations and depressions, lay outward from the

macula, and projected forward some distance into the vitreous. The patient presented general arterio-sclerosis, and died with cerebral hemorrhages.

When the eyeball was opened an elevation was found outward from the macula, having a height of 2 *mm*, and a maximum breadth of 3 *mm*.

Microscopic.—The retina, near the ora serrata, presents the picture of œdema of the retina (Iwanoff), large cystic cavities being present. Nearer the pole of the eye the cysts become smaller, and the retina is abnormal only in the hypertrophy of Müller's fibres. To the temporal side of the disc the cysts, here filled with colloid masses, reappear. The inner nuclear layer is here distorted and mostly destroyed, and the nerve-fibre layer has disappeared entirely. The retinal vessels have atheromatous walls, and particularly the choroidal arteries have walls so thickened as to obliterate the lumen entirely in some cases. In the elevated fold of the retina near the macula, Müller's fibres are hypertrophied, and there are cellular deposits of various sorts. A large retinal vessel breaks up into smaller branches and capillaries along the fold, and some of these pass out of the retina and end in the vitreous among the hemorrhages, apparently being in connection with the new formations in the vitreous. About these vessels are leucocytes, spindle cells, and fibrillæ. The new formation is partially covered with a membrane, which I take to be the hyaloid, and partly adjoins directly the coagula of blood.

The left eye exhibits similar retinal changes though in less degree.

To recapitulate, the chief changes are (1) atheroma of the vessels leading to hemorrhage, (2) œdema of the retina characterized by the presence of cystic cavities and hypertrophy of Müller's fibres, and (3) a very vascular connective-tissue new formation in the vitreous resting on an elevated fold in the retina.

REPORT OF THE PROCEEDINGS OF THE OPHTHALMOLOGICAL SECTION OF THE SIXTY-FIFTH ANNUAL MEETING OF THE BRITISH MEDICAL ASSOCIATION, AT MONTREAL, SEPTEMBER 1 TO 4, 1897.

By Dr. J. A. SPALDING, Portland, Maine.

After a day of preliminary work of the Association, consisting in a service in the Cathedral Church, where a noble sermon was delivered by the Lord Bishop of Niagara, and in an afternoon of addresses of welcome and of information concerning the Dominion of Canada as a whole, by many distinguished medical and political personages, including the Governor-General, the Premier, Lord Lister, and others, the actual Sectional work began at 10 o'clock on the morning of Wednesday, September 1st.

The Section on Ophthalmology met in one of the delightful recitation rooms of the Engineering Department of McGill University, Mr. Edward Nettleship, F.R.C.S., of London, the President, in the chair. After a brief address of welcome, and of regret that so few of the Ophthalmic Surgeons of Great Britain were on hand, and of outline of the work to be done, the meeting opened with the presentation of a recent case of **Mules's operation** on a boy of ten, by Dr. Buller, of Montreal. The result was very good, and the mobility of the artificial eye on the inserted glass globe remarkable.

Dr. H. D. Noyes, of New York, then began the discussion of the chief topic of the day, **Antisepsis in Ocular Surgery,** in which he detailed all of the minutiæ of modern antiseptic surgery on the eye: the preliminary care of the patient; soap and water to the face and surrounding region; boric acid for the same district after the preliminary washing; hot water, carbolized, for the instruments; a pad to cover the eye to be wet in a 1 to 2000

bichloride solution; the instruments to be put into actually boiling water; then to be placed for a while in pure alcohol just before the operation; next great care for cleanliness by the operator himself; and sterilized dressings for the eye after the operation was done.

All solutions to be used about the eye before or after operations should be thoroughly sterilized,—atropine or cocaine or any other. All coverings to the eye after an operation should be soaked in 1 to 2000 bichloride, and should remain *in situ* at least twenty-four hours; possibly it were better to let them remain longer than that. If the anterior chamber is to be irrigated, it should be done with a bulb-syringe—that is to say, not with a piston syringe,—and using weak boric-acid solutions. At present Dr. Noyes does not irrigate the anterior chamber at all, and he has abandoned all solutions of iodide of mercury, and indeed other preparations of that drug for such a purpose. Irrigation should not be done with a solution stronger than two per cent. strength of boric-acid solution.

Dr. Noyes thought that two cases of corneal suppuration that he had seen after cataract extraction were due to defective plumbing in the rooms where the patients remained in bed after the operation. Personally, he preferred moist dressings to an eye after operations, and he insisted on their remaining *in situ* a whole day at the least. Inspection of the eye at that time after an operation was very desirable, even imperative, and if any suppuration were present, he should rely on hot boric solutions (106° to 110° F.)

These remarks were made without notes and were characterized by great clearness of intention and definition, and extreme fluency of diction, and were received, in closing, with gratified applause from the audience, which by this time amounted to about thirty-five members present.

The discussion of the topic was then taken up by many members, and of what each one said, a brief résumé now follows.

Dr. RANDOLPH, of Baltimore, thought that the use of too hot applications for the instruments to be used in operations on the eye was likely to dull the edge of the knives especially, and for that reason he did not put the instruments into too hot aqueous solutions but into alcohol. He also paid extreme attention to the condition of the lachrymal secretions, and irrigated the sac very freely with boric acid in distilled water.

Dr. BULLER, of Montreal, thought that a preliminary bandaging of the eye for a day or two before the operation was uncalled for; he simply applied absorbent cotton dry, and dusted with boric acid finely powdered. He uses no mercurial solutions in the eye, and relies on moist dressings and a firm, though light bandage after the operation.

Occasionally, a dry iodoformed bandage may be used after the operation. In cases of chronic eczema about the face in the region of the eyes and lids, he used before asepsis to have suppuration of the cornea, but now gets good results after careful antiseptic preparatory treatment, as well as at the time of the operation.

Dr. E. JACKSON, of Philadelphia, thought that any preliminary bandage was bad practice, as it puts the eye into a worse condition to bear the operation. As the nose is often the starting-place for lachrymal difficulties, the nostrils ought to be carefully examined, and treated wherever there is suspicion of lachrymal disease in eyes to be operated on with a corneal incision. Antisepsis in any operation on the lens, means also a thorough removal of all lens substance and irrigation of the anterior chamber.

Dr. FRYER, of Kansas City, would like to continue the preliminary treatment of the eye with weak solutions of bichloride (1 to 6000) from one to three weeks before operation. He thinks he gets better results in that way. He does not care for boric acid, thinking it no better than hot water or the normal salt solution.

Dr. RIVERS, of Denver, uses a 1 to 5000 bichloride solution for all operations in which the eye is to be opened. He believes in a prolonged preliminary treatment, and in thus destroying the germs that infect the eyes. He sterilizes all water for solutions just previous to the operation on the eye.

Dr. MITTENDORF, of New York, thought that boric acid helped to keep atropine and other solutions in better condition, and was much in favor of boric acid and vaseline as an after dressing for operated eyes.

Dr. RYERSON thought that some operators carry asepsis on the eye too far, and he could see no good, for instance, in rubbing and scrubbing the under surface of the upper lid. He was in favor of irrigating the anterior chamber freely.

Dr. WUERDEMANN, of Milwaukee, prepares his own solutions so as to be sure that they are aseptic. He approves highly of holo-

caine in one half per cent. to one per cent. solutions. It is as germicidal as bichloride 1 to 10,000, and has no ill effect on the cornea.

Dr. CALHOUN, of Atlanta, had had good results in operations on negroes under the worst septic conditions. The conjunctiva of the negro will not tolerate any cocaine stronger than one half or possibly one per cent. solution, nor will it tolerate more than 1 to 10,000 bichloride. He uses boiled water, which is as good as boric-acid solutions, and has seen but very few cases of suppuration in the negro's cornea.

After brief remarks by Drs. CHARLES H. WILLIAMS, of Boston, ALT, of St. Louis, and BAKER, Dr. HOWE, of Buffalo, thought that we ought to leave the question of the best aseptic agent to the bacteriologists.

Dr. SPALDING, of Portland, Me., suggested the closure of the puncta with a hot wire where we had reason to think the lachrymal secretions dangerous, and then opening them later. He was in favor of boric-acid preliminary treatment, especially in skin diseases about the eye, and favored as exact asepsis the removal of an old and sightless stump in one orbit previous to attempting any operation on the other cataractous eye.

Mr. EDWARD NETTELSHIP had sent circulars on this topic to his confrères in Great Britain, with the result of finding them unanimous in exercising the greatest care in preparing patients, the room for the operation, hot-water solutions, care in cleansing the eyelashes and eyebrows, and the lachrymal secretions. In regard to the last there was a diversity of opinion, probably the best means being extirpation of the sac in bad cases, though we might treat it with probes or introduce a style of iodoform and gum if the passage is widely open. Instruments should be put in boiling water, though some thought it dulled the edges [Why not examine with the microscope the effect of boiling hot water on the cutting edges of knives used for the eye?—J. A. S.], then in hot water and carbolic acid 1 to 40. He sees no harm in putting knives for a brief moment into boiling water. Most English operators use their instruments wet, right from the hot carbolic solutions or from the hot water plain. Only few Englishmen used sterilized dressings after operations, and either wet or dry seems to make but slight difference. Preliminary treatment is usual. He uses boiled distilled water and always washes out the upper *cul-de-sac* of the conjunctiva. Some wipe the inner

surface of the lids with dry wool. So that on the whole the prevailing idea is asepsis, and thorough cleanliness.

In conclusion, Dr. NOYES reverted favorably to the various points raised, and remarked that so far as removing an old sightless stump was concerned, he used to do so ten years ago but did not do so now, and had no reason to think that any harm had thus resulted to his patients.

Dr. F. BULLER next read a paper on **Mules's operation,** or rather on a modification of the same as first described in the *Transactions of the Ophthalmological Society of the United Kingdom*, vol. v., p. 200. The reasons for the need of a modification were the frequently intense pain and the extrusion of the glass globe in a large percentage of instances, both of which were probably due to the circular opening, the use of catgut suture, and no means to prevent the conjunctival secretions from reaching the imperfectly closed wound. Buller, therefore, makes two triangular openings in the sclera, their bases joining in the centre of the cornea, forming thus a large *vertical opening in the sclera,* which offers plenty of chance for cleansing and inspection and excellent closure. White and black china-silk sutures are employed in the sclera and conjunctiva respectively. The contents of the globe are scraped out with a Volkmann's spoon, and the most rigid asepsis is carried out. He does not wait for all bleeding to cease before terminating the operation. There is no change of dressing for two days, unless pain is intense, when he uses cold applications, with frequent changes. He thinks the operation is preferable to enucleation, evisceration, or optico-ciliary neurotomy. The latter he has never tried after seeing a case in which after this operation sympathetic ophthalmia ensued. He sees great advantages in a stump thus operated on, over enucleation, as it gives better movement to the artificial eye and leaves a healthy conjunctiva that is not constantly irritated by retained lachrymal secretions.

Dr. G. M. GOULD, of Philadelphia, followed with a report of two very rare cases of **Retinitis pigmentosa without typical pigmentation,** in which he related the history and showed the visual fields of a sister and brother who had applied to him for disturbances of vision. The sister applied first, owing to loss of sight and asthenopia, and after mentioning previous loss of sight at night and in darkened halls or corridors, careful tests were made with the perimeter, which showed to the author's satis-

faction that the case was one of retinitis without the pigmentation, all that the ophthalmoscope revealed being striæ in the choroid. At this point the brother was examined and similar defects discovered. There were also traces of a similar affection in the progenitors of the family, though no examinations were ever made. Dr. Gould, urged more careful tests of the field, in all cases where patients walked with the "Bowed Head," as he expressed it, meaning holding of the head forward in order to see better downward whilst walking in unknown districts, thus foreshadowing an affection of the periphery of the retina, and consequent limitation of the visual field.

In the discussion, Dr. HOWE, who has studied retinitis pigmentosa very extensively, thought that cases like these were actually not so rare, but often overlooked. Now that attention had once more been called to them, others were likely to crop up into public notice.

Dr. CHARLES LEE, of Liverpool, read (or presented for reading) a paper on **A curious tumor springing from the orbit and side of the nose close to the inner canthus,** which then spread in a reddish mass all over the neighborhood. On operating, the tumor was found to extend into the maxillary antrum, but as the patient's consent to the removal of the entire superior maxilla had not been obtained previous to the operation, these latter masses were obliged to be left behind. Later, the patient refused to have any further operation done, and disappeared from view. Some months later, Dr. Lee had a letter from a fellow practitioner in the country, telling him, not that the patient was dead, of a malignant tumor (for microscopic examination at the time of the operation showed what appeared to be a round-celled sarcoma), but that he was alive and that all traces of the tumor had disappeared. The patient, it seems, having heard of the cure of cancer by cinnamon juice, procured some cinnamon and, making a strong infusion, took the same regularly for some months, with the above-mentioned remarkable results.

A very interesting and important case of **Metastatic carcinoma of the choroid** (primary disease in the thyroid) was communicated by Dr. MATHEWSON, of Montreal, and the President showed a specimen of a similar condition which had been sent from the Moorfields Hospital by Mr. Devereux Marshall.

On the President's desk during the session were displayed a number of fine specimens imbedded in glycerine jelly, and pre-

sented for observation by Mr. Charles Marshall and Mr. Priestley Smith.

Thursday, September 2d, the meeting was opened as before by the President, and the first paper read by Dr. ALT of St. Louis, on the **Histology of an unusual case of total blindness after injury to the skull.** This is the first case on record of a *recent* choroidal rupture being histologically examined. The patient was accidentally shot with a revolver bullet in the left temporal region, and the eye, after being totally blind, was enucleated a few days later owing to enormous exophthalmos from the abundant orbital hemorrhage. Without sympathizing with the necessity for the removal of the eye, Dr. Alt spoke at length of the histological details, and referred fully to the literature bearing on the topic. The patient recovered, but no trace has yet been found of the bullet, which is supposed to be lodged in the frontal sinus.

Dr. REEVE read a paper on **Experiences with cataract,** suggestive with practical points, but without any statistical tables. Thus, the patient was not to have magnified to him the operation. The practitioner was not to call in the services of a second practitioner in order to magnify to the patient the seriousness of the whole affair. The writer preferred to operate alone, rather than to have unskilled assistance, if such a term can be used. He does not operate unless the second eye is also affected to quite a degree of blindness. On the contrary, do not wait till patient loses sight totally in both eyes, because it acts depressingly. He generally waits for ripeness of cataract, but does not hesitate to operate on immature, smoky, or dark cataractous lenses. He does not like Foerster's manipulation to ripen the lens, but Bettman's. And, nevertheless, he prefers to operate at once rather than to ripen preliminarily immature, hard cataracts. He rarely does a preliminary iridectomy. He presses out the puncta and canaliculi before operating. He always makes a small iridectomy.

He uses boric acid exclusively as an antiseptic lotion, cocaine sterilized, makes a small flap, often removes flakes of cortex with forceps, and is careful to remove the speculum after the section is finished. He covers the eye with a pad, light bandage, and mask. Simple extraction is done in docile patients, who are in the minority in his practice. He does not like eserine, and pays no attention to prolapses unless large. He often removes a bit

of the capsule with the forceps. Subsequent capsulotomy is done with Knapp's knife-needle. He has seen three cases of destructive hemorrhage after extraction. In cases of dislocation of the lens, he contracts the pupil with eserine, and then makes the corneal incision.

Dr. G. T. STEVENS, of New York, spoke on **A suggestion regarding an element in the ætiology of trachoma,** in which he supported the theory that an anomalous position of the horizontal plane of the eyes was the cause of trachoma, the eyes being elevated and the nervous force of the eyelids and eye muscles pressing the eyes downward so as to see well below the horizontal plane being the exciting cause of trachoma. He had seen cases of unilateral trachoma in which the eye affected deviated upward more than the other, and consequently suffered from the trachomatous disease, and was cured by proper lenses and muscular correction. The real causation of the deviation of the horizontal plane of the eyes was the result of the malformation of the skull.

The discussion took a wide range, and, amongst others, FOUCHER, of Montreal, remarked that in Canada Indians there were very few cases of trachoma, but in Manitoba Indians it was not rare at all. He thought this might be due to excess of snow and glare on the ice and snow in the latter country.

Dr. G. M. GOULD was quite unable to see how eyelid-pressure could produce trachoma at all.

Dr. PROUDFOOT remarked on the rarity of trachoma in native Indians.

Dr. LUCIEN HOWE spoke of variations in the direction of the orbital axis as a possible cause. He thought the histology of the negro eyelid and that of the white man identical. He was quite sure that germs were the only cause of genuine trachoma. He had seen in Egypt epidemics of ophthalmia produced by flies carrying germs from diseased eyes to those that were healthy, and he had seen cultures made from the droppings of flies walking across a plate of clean glass. In Finland, smoky houses full of peat- and grass-smoke were a prevalent cause of trachomatous disease and of blindness.

Dr. RYERSON thought that trachoma was very rare in Indians, but that on the contrary pterygium was quite common.

Dr. OSBORNE had seen several thousand Indians, and had never seen a case of trachoma.

Dr. STEVENS thought that there were different degrees of rotation with different shaped heads, and this led to his examination of skulls, whereupon he found racial differences. He still thought that he had cured cases of trachoma in the manner indicated.

Dr. F. BULLER read a paper on **Abnormalities in the functions of the extrinsic ocular muscles,** laying down the points on which he treated certain patients with glasses, and others by correcting their muscular deviations. He regarded a normal adduction as 25°, and normal abduction as 5°; beyond that were abnormities. He only operated for loosening or making a graduated tenotomy in chosen cases. He did not operate in every case of muscular imbalance. He had operated on 110 cases, and thought that he had permanently relieved about nine tenths of them all. He had never seen a patient injured by the operation. The correction of any ametropia was the first step; the tenotomy only later, when refractive errors being corrected, imbalance persisted with nervous symptoms and headache. He had cured by operation two cases of esophoria with vertigo.

Dr. STEVENS thought that for the sake of comparison we should confine ourselves to similar methods of examination and similar terms. He regarded 8° as normal abduction, not 5°, and dilated on the various methods of examination, and spoke disparagingly of the results obtained by testing with Maddox's rod.

Dr. MITTENDORF thought there might be something wrong in these theories and operations, when they had to be repeated so many times. He thought that the ideal operation and results had not yet been obtained. In his opinion, graduated tenotomies are of benefit in but very few cases.

Dr. PROUDFOOT was of the opinion that if we corrected the minutest errors of refraction there would be very few cases needing any operation at all.

Dr. MARLOW thought that errors with Maddox's rod might be due to the greater refraction of a red glass. He corrected the slightest errors of refraction, under a mydriatic, used exercising prisms, and never operated until these things had been carefully attended to. He insisted on leaving the eye open after every graduated tenotomy.

Dr. LUCIEN HOWE thought that all of the cases occurring so often in anæmic patients, it would be useful to examine the blood and to treat them constitutionally. He had often found a plane glass and a change of air and scene useful in such cases.

Dr. RYERSON had cured a case of epilepsy by graduated tenotomy, but he never operated in the slight degrees.

Dr. TROW thought that abnormal ocular muscles could be benefited by general treatment. He had seen cases of slight amount of deviation made distinctly worse by the operation. He had seen a case of epileptiform seizures cured by general treatment and appropriate lenses without the operation.

Dr. BULLER, in closing, expressed the opinion that a uniform standard for all cases was impossible to attain. He had been pleased with the results obtained by Maddox's rod, but he acknowledged that he always found greater deviation by the rod-test than with the phorometer. He repeats his operations if the imbalance does not seem to be relieved; but, at the same time, he tries to correct it at the first operation if possible. He does not often have to repeat, except in the small degrees, where caution is needed at first not to cause over-effect. He does not recall operating more than twice, and, on being questioned, insisted that exact refractive correction was always the first thing done. His patients, he regretted to say, were unable to distinguish any difference between 0.12 and 0.25 of refraction. Every case of refraction in his practice, in persons of ordinary age, was done under the influence of atropine or homatropine.

Dr. JEHIN PRUME, of Montreal, read a paper on **The treatment of syphilitic eye diseases,** in which, after insisting on the advantages of mercurials and then dilating on the numerous inconveniences of the usual methods of administration of this powerful remedy, he urged the advantages of intravenous injections of the cyanide of mercury, beginning with minute doses and gradually increasing. He showed an antiseptic syringe made entirely of glass, with platinum needle, and reported a number of cases in which great benefit resulted from this treatment, where other forms of mercury had been used in vain. He had made over two thousand injections without harm, and with benefit in most patients.

Dr. Prume employs the cyanide of mercury, using one gramme in one hundred grammes of water, and of this he takes a syringeful containing one gramme of the fluid, and beginning with a quarter of a gramme, he gradually increases to one full cubic centimetre of the fluid. The vein is made prominent by bandaging the arm as for bleeding; the arm is kept horizontal and the platinum needle is passed lengthwise into the vein. He gives

twenty injections, one every other day; then twenty more, one every third day; twenty more, one injection every fourth day; and, finally, one injection a week, and then the medicine is suspended. He thinks that there is no danger in the proceeding, and he reported cases of long standing in which great relief was obtained and vision noticeably increased.

Dr. E. JACKSON presented a brief paper, with illustrations in color, of some cases of **Foreign bodies in the cornea.**

Dr. RANDOLPH'S paper was on **The use of salicylate of soda ointment in lanolin in cases of vernal catarrh of the conjunctiva.** This remedy was used in varying strength in each case, according to the exigencies of the condition of the eye, and was in the writer's opinion of great value over other remedies so far discovered. He used, generally, an ointment of from 1 per cent. upward to 5 per cent.

Friday morning, September 3d, the Section met at the usual hour, and a paper was read by Dr. CHARLES H. WILLIAMS, of Boston, on **Simulated unilateral blindness**, and a new test shown consisting of red and green corrugated discs, to be held in spectacle frames in such a way as to produce double images of confusion. After this, Dr. Williams explained in full detail his very useful apparatus for testing the color sense in railroad employees, as well as for testing the vision for colors and objects under unfavorable conditions of weather, fog, and smoke. A full discussion of the entire topic followed, showing the absolute need for such examinations as a duty to the travelling public and as part of public health investigations by physicians.

Dr. G. H. BURNHAM, of Toronto, read a paper on **The hypodermatic use of pilocarpine in eye diseases,** in which he advocated the use of pilocarpine in combination with other alteratives in deep-seated diseases of the eye. He invariably supplemented mercurials and the iodide of potassium with properly conducted pilocarpine injections, in syphilitic eye diseases as well as in all cases of irido-choroiditis. The injections were always given in the afternoon in bed, in order that, after the effect had passed off, the patients could have proper rest in bed and not be subject to the risk of taking cold by going out before the next morning. Several favorable cases were reported, but it would seem best to eliminate the action of the other remedies by total suspension of the same during the course of the injections, in order to discover where the most benefit resides.

One or two of the members present spoke of the loss of weight which some patients always meet with in going through with this method of treatment by pilocarpine.

Dr. WUERDEMANN read an enthusiastic paper on **The advantages of sciascopy as a test for refraction and one standing high above all other methods.** He was not enthusiastic as a new hand at the sciascopic test, but he was so even after using it for ten years. It was preferable to any other means of testing the refraction, having, as a whole, advantages over any other single method. He also showed a new plane mirror to use in making the test, as well as a series of lenses for the patient to hold before the eye during the examination.

The brief discussion showed many members very much in favor of the test.

Dr. PROUDFOOT, of Montreal, presented a very interesting paper on **The value of weak lenses in certain cases of asthenopia;** and the President called attention to a new form of syringe for flushing the sac and lachrymal nasal passage.

In closing the session, the President thanked the members present for their interest in the work, spoke of what farther progress we might look for and in what directions, and pronounced the Congress adjourned.

After a vote of thanks to the Secretaries, an invitation from Dr. Buller was read, asking the presence of the members at the clinic at the Royal Victoria Hospital on the same afternoon, where, at four o'clock, Dr. Buller showed several interesting cases, including one of discission for myopia, and performed a nice cataract extraction with iridectomy.

In conclusion, the reporter wishes to offer many thanks to the Secretaries, Dr. Jehin Prume and Dr. Stirling, for frequent opportunities to look over all the papers, as read in succession, and also especially to Dr. Charles H. Williams, of Boston, who very kindly assisted the reporter in following out the discussions by offering him constant perusal of his abundant notes.

SYSTEMATIC REPORT ON THE PROGRESS OF OPHTHALMOLOGY IN THE FIRST QUARTER OF THE YEAR 1897.

By Dr. ST. BERNHEIMER, in Vienna; Prof. C. HORSTMANN, in Berlin; and Dr. P. SILEX, in Berlin;

WITH THE ASSISTANCE OF

Dr. S. M. Burnett, Washington; Dr. Dantone, Rome; Dr. Herrnheiser, Prague; Prof. Hirschmann, Charkow; Dr. P. von Mittelstädt, Metz; Dr. Sulzer, Geneva; Dr. L. Werner, Dublin; Dr. C. H. A. Westhoff, Amsterdam; Dr. Schiötz and Dr. Ole Bull, Christiania; Dr. R. Greeff, and Dr. Deus, Berlin; Prof. Da Gama Pinto, Lisbon; and others.

Translated by Dr. Ward A. Holden.

Sections I.–V. Reviewed by Dr. ST. BERNHEIMER.

I.—GENERAL OPHTHALMOLOGICAL LITERATURE.

TREATISES ON GENERAL, BIBLIOGRAPHICAL, AND HISTORICAL SUBJECTS. STATISTICAL REPORTS.

671. Adamück, E. V. The diseases of the percipient apparatus of the eye. Kasan, 1897. 2 vols.

672. Massachusetts Charitable Eye and Ear Infirmary. 71st annual report, 1896.

673. Eye, Ear, Nose, and Throat Hospital of New Orleans. 6th annual report, 1896.

674. Brooklyn Eye and Ear Hospital. Report for 1896.

675. Stilling, J. The rudiments of ophthalmology. Vienna and Leipsic, Urban and Schwarzberg.

676. FUCHS. Text-book of ophthalmology. 6th edition, Vienna and Leipsic, Deutike.

The number of new eye patients treated at the Massachusetts Charitable Eye and Ear Infirmary (672) during 1896 was 15,359. The number of in-patients was 912. The total number of operations was 1928, including the minor—60 enucleations, 77 operations on the muscles, 52 on the iris, and 275 on the lens. The number of senile cataract extractions was 126. Of these, 45 were Graefe's, with no absolute losses and 1 p. l.; 40 simple, with no losses and only 1 as low as 0.05; 41 with buttonhole of the iris, with 2 losses and 1 "shadows." A carefully prepared table of these cases in the institution is given as usual.

BURNETT.

The noteworthy features of the 6th annual report of the Eye, Ear, Nose, and Throat Hospital of New Orleans, Dr. H. D. Bruns, surgeon (673), as to its ophthalmological practice, is the complete tabulation of the age, sex, color, employment, with treatment, duration, and condition at discharge of every patient registered, numbering 2289 in all. There were 196 operations performed, among which were 23 extractions of senile cataract, 8 enucleations, and 21 strabotomies. BURNETT.

During 1896 there were treated at the Brooklyn Eye and Ear Hospital (674) 9889 eye cases; 1326 operations were performed, including the minor; 48 extractions with iridectomy, 24 without; 19 enucleations, 46 iridectomies, 18 tenotomies, 2 removals of steel from vitreous with magnet. BURNETT.

STILLING'S (675) *Rudiments of Ophthalmology* is a carefully prepared book, clearly written and well illustrated. Particularly complete are the chapters on anatomy, physiological and pathological optics, methods of physical and functional examination, and anomalies of refraction and disturbances of motility.

The sixth edition of FUCHS'S (676) text-book is enlarged, and contains many new illustrations, of which those illustrating the development of the eye are particularly commendable.

II.—GENERAL PATHOLOGY, DIAGNOSIS, AND THERAPEUTICS.

677. EWETZKY. Cyclitis in a monkey after recurrent fever from inoculation. *Wjest. Ophth.*, 1897, No. 1.

678. BULLOT. The action on the cornea of inhalations of chloride of ethylen.

679. HJORT. The after-treatment of cataract patients. *Nordisch med. Archiv*, Jubilee volume xxxi., Stockholm, 1897.

680. MACLAREN. Intracranial aneurism treated by ligature of the common carotid. *Brit. Med. Journ.*, Jan. 2, 1897, p. 10.

681. MARSHALL, C. D. On tension in cases of intraocular tumor. *Trans. Ophth. Soc. Un. K.*, xvi., p. 155.

682. FRENCH, C. G. Description of an eyeball lost from gonorrhœal ophthalmia. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1897.

683. CONNERS, W. F. Amblyopia ex anopsia. *N. Y. Med. Journ.*, Jan. 2, 1897.

684. BURNETT, SWAN M. Some unusual congenital anomalies of the eye. *Ophth. Record*, Jan., 1897.

EWETZKY (677) inoculated a monkey with a couple of drops of blood containing spirillæ from a patient suffering with recurrent fever. Spirillæ were then found in the monkey's blood. A fortnight later the left eye became affected, and the following condition was found: Moderate perikeratic injection, a semi-transparent exudation in the anterior chamber, punctate brownish-gray precipitations on the membrane of Descemet, no synechiæ, pupil dilated but responsive to light. Atropine and cocaine were instilled. Ten days later the eye was again normal. The right eye was not attacked. HIRSCHMANN.

Inhalations of chloride of ethylen cause in dogs a porcelain-like opacity of the cornea, an increase in corneal curvature, and perikeratic injection. According to BULLOT (678), the ethylen chloride collects in the anterior chamber, destroys the corneal endothelium, and enters the corneal substance. Puncture of the cornea prevents the development of the opacity, since the ethylen flows out with the aqueous humor.

For some time HJORT (679) has allowed his operative patients to go without being bandaged, and his results are the best possible. The old observation that many eyes bear a bandage badly, as well as the idea that the tears and the free movements of the lids remove the micro-organisms from the eye, first led the author to bandage his operated eyes for twenty-four hours only, and then to leave them open. As a preparatory measure epilation of the lashes is undertaken for the purpose of more easily cleansing the lid margins. In the course of the operation the only antiseptic used is 2-per-cent. boric-acid solution. After the operation

is finished the patient is led to his bed by two assistants. The room is not kept very dark. The author believes that extraction without iridectomy is less likely to be followed by reaction than extraction with iridectomy. In three months 39 operations in which the ball was opened were done, with smooth healing in all.

SCHIÖTZ.

MACLAREN'S (680) patient, a woman aged forty, suddenly developed a cavernous-sinus aneurism on the left side, which presented the usual symptoms. The external rectus alone was paralyzed. V. normal. Pressure on the left carotid stopped the bruit. After ligature of the common carotid, all the symptoms disappeared in two days, with the exception of the paralysis of the external rectus, which recovered in three weeks. The arteries were atheromatous, and kangaroo tendon was used as ligature. (I have had a well-marked case in which the symptoms disappeared equally rapidly after ligature of the common carotid. It is now over two years since the operation, and the patient is as well as ever he was. During the recovery a temporary embolism of the central artery occurred, which lasted only a few hours.)

WERNER.

MARSHALL (681) examined 100 cases with reference to the tension, and arrived at the following conclusions:

1. The tumor has little to do directly with the tension of the eye, until it nearly fills the globe or perforates it.

2. The cause is closure of the angle of the anterior chamber.

3. Closure of this angle is more frequent in sarcoma of the choroid than when the growth is in the iris or ciliary body.

4. Diminished tension is not uncommon when the ciliary body is involved.

5. In sarcomata of this region the tension is not increased in the majority; a few of these have minus tension.

6. Most gliomata are accompanied by normal tension; a few have diminished tension.

7. The tension in many cases varies in different stages.

WERNER.

The interesting feature in this report (682) is the finding of the gonoccocci in the lymph spaces and in some of the smaller blood-vessels. These were accompanied by staphylococcus pyogenes extending as far back as the equator of the globe.

BURNETT.

CONNERS (683) reports four cases, three of which were conver-

gent strabismus, in which the defective eye was, by exercise, improved very much, increasing in one from $\frac{6}{200}$ to $\frac{20}{40}$, in one from $\frac{4}{200}$ to $\frac{20}{100}$, in one from $\frac{10}{200}$ to $\frac{15}{40}$, and in another, not strabismus, from $\frac{15}{200}$ to $\frac{15}{15}$. BURNETT.

The first of BURNETT's (684) cases is a peculiar folding of the conjunctiva of both eyes at the inner canthus, below and encroaching on the inferior internal quadrant of the cornea. 2d. Congenital opacities of both corneæ, consisting of a circular band midway between the pupil and periphery of dense white, the intermediate substance being more translucent. 3d. Floating bands in the vitreous, with no history of trauma or inflammation, and considered congenital and due to defective development. All three cases are illustrated. BURNETT.

III.—INSTRUMENTS AND REMEDIES.

685. BRILIANTOW. On subconjunctival injections of parachlorphenol. *Dissert.*, St. Petersburg, 1896.

686. RECLUS. Eucaine and cocaine. *Acad. de médicine de Paris*, Jan. 16, 1897.

687. SMITH, PRIESTLEY. A new method of mounting ophthalmic specimens. *Ophth. Rev.*, xvi., p. 4.

688. RANDOLPH. Absolute alcohol as a disinfectant for instruments. A bacteriological study. *Trans. Amer. Ophth. Soc.*, 1896.

On account of the unpleasant effects of injections of bichloride, BRILIANTOW (685) undertook to substitute injections of parachlorphenol, which has a marked antiseptic action, is less irritating, and does not form insoluble combinations with the tissues. Injections of small quantities of a 1 %–2 % solution cause a feeling of burning, which passes away in a minute or two. In cases of corneal ulcer with hypopyon, the action was favorable; the ulcer cleared, the hypopyon disappeared, and the pain ceased. Two injections were sufficient. In cases of plastic iritis, the pain diminished and the atropine acted more energetically. In cases of trachoma and parenchymatous keratitis, the injections had no effect. HIRSCHMANN.

A comparison of the action and toxic qualities of eucaine and cocaine leads RECLUS (686) to the following conclusions. Eucaine is an actual analgesic nearly as efficacious as cocaine. In a field of operation anæsthetized half with cocaine, half with eucaine, the

sensibility to pain is almost completely absent, but less so in the part treated with eucaine than in that treated with cocaine. The action of cocaine lasts twice as long as that of eucaine. Notwithstanding the statements of Liebreich, Veiscini, and Schleich to the contrary, eucaine is as poisonous as cocaine, as Pouchet found by forty-eight experiments on animals. What makes eucaine more dangerous than cocaine is the fact that the toxic symptoms are not preceded by prodromes. Subcutaneous injections of eucaine are painful and bring about hyperæmia of the tissues.

SULZER.

PRIESTLEY SMITH (687) hardens the eye in "formalin" and then preserves it in a 10-per-cent. solution in a glass jar, as in the glycerine-jelly method, except that it is closed by a perforated rubber bung, which is closed by a glass rod which supports the specimen. The water with which the formalin solution is made should be boiled and cooled, to prevent bubbles.

WERNER.

As a result of a large number of experiments, RANDOLPH (688) has arrived at the following conclusions: 1. That instruments are most frequently infected by exposure to air. 2. That under the ordinary surrounding conditions absolute alcohol is a valuable disinfectant for instruments; but that the septic character of instruments infected with a pure culture of staphylococcus albus is not altered by an exposure for twenty minutes to the action of absolute alcohol. BURNETT.

IV.—ANATOMY.

689. ELINSEN, A. On the vaso-motor nerves of the retina, Kasan, 1896.

ELINSEN's (689) investigations on cats and dogs showed that the vaso-motors of the retina form a part of the fibres of the cervical sympathetic, pass with the latter into the first cervical ganglion, enter the cranial cavity, and separate in the cavernous sinus into three bundles of different thickness. The thickest bundle passes with the oculo-motor nerve and its short root to the ciliary ganglion; the thinnest bundle passes to the ganglion of Gasser, and, with the ophthalmic branch of the trigeminus, through the long root, to the ciliary ganglion; the third, medium-sized, goes to the ciliary ganglion through the sympathetic root. From the ciliary ganglion the vaso-motor fibres enter the optic nerve and pass to the retina, where they apparently run with free ends in the vascular layer. HIRSCHMANN.

V.—PHYSIOLOGY.

690. LAURENTI, K. On the theory of the movement of sciascopic shadows. *Wjest. Ophth.*, 1897, No. 1.

691. MESMET. The rôle of the anterior epithelium of the cornea in ocular exosmosis. *Soc. de biol.*, Jan. 9, 1897.

692. GRADLE, H. On the correction of astigmatism by unequal contraction of the ciliary muscle. *Graefe's Archiv*, xliii., 1, p. 252.

693. HESS, C. On the existence of partial contraction of the ciliary muscle. *Ibid.*, p. 257.

694. BULL, G. J. The visual effects of refractive error. *Trans. Ophthal. Soc. Un. K.*, xvi., p. 200.

695. ALLEN, S. BUSBY. Heat waves and glare. *N. Y. Med. Journ.*, Oct. 10, 1896.

696. STEVENS, G. T. Examinations by the tropometer, and some of the phenomena observed. *Ophth. Record*, May, 1897.

LAURENTI (690) experimented with an eye model, constructed by himself and having an adjustable focus. He found that neither the size of the opening in the mirror nor the distance of the mirror from the eye examined had any marked influence on the accuracy of the determination of the astigmatism. HIRSCHMANN.

In opposition to Leber's view, now generally accepted, that the endothelium on Descemet's membrane prevents the filtration of aqueous humor, MESMET (691) believes that this rôle falls to the corneal epithelium. Anatomically the endothelium of Descemet's membrane differs little from the endothelium of serous membranes which offers no resistance to diffusion. This characteristic is common to all tissues of mesoblastic origin, while the chief protecting tissue, the epithelium of the skin, arises from the ectoderm, as does the epithelium of the cornea.

Clinically it is recognized that the bullous keratitis frequently complicating glaucoma is due to an elevation of the anterior corneal epithelium. The increased tension brings about inbibition of the cornea, since the barrier to the pressure is at the anterior surface of the cornea. By this experiment it can be shown that the cornea when deprived of its anterior epithelium is pervious to the aqueous humor. When an iron salt is injected into the anterior chamber, and a ferro-cyanide solution is spread on the surface of the cornea, the blue reaction appears only at the

points where the epithelium is wanting; a lesion of the endothelial layer, notwithstanding Leber's views to the contrary, is not required in order to bring about the reaction. SULZER.

GRADLE (692) believes in opposition to the statements of Hess, that in an observation published in 1879, to which he now adds another, he has proved that many astigmatic persons are able in reading to lessen their astigmatism by means of irregular contraction of the ciliary muscle.

HESS (693) proves that Gradle's observations are not in the slightest degree adapted to render plausible the idea of a partial contraction of the ciliary muscle, which Hess declares cannot take place. Both of Gradle's patients had very poor vision.

In a very interesting paper of forty-seven pages BULL (694) describes the deformations of the visual images of test types, lines, etc., due to various refractive errors. He first illustrates, by means of photographs of the types, under a given error, the probable effect of such error on the visual images, and then explains how the real visual images differ from the photographic results. In the latter there is an even radial diffusion of all points of the image leading to a mere blurring and indistinctness, while the visual image resolves itself into several superposed mages, some of which not coinc*i*ding with the rest, stand out, as it were, causing monocular polyopia or diplopia. This occurs in all errors of refraction and is a natural consequence of the resolution of the visual image. When the photographic images are compared with the objects as seen by the eye rendered artificially ametropic, to the same extent as the photographic camera, it was found that the eye could distinguish letters which seemed very indistinct in the photograph, but this is due to information from movements of the head and eye, inclinations of the glass, variations in accommodation, which give different pictures for comparison. The photographs show very clearly that letters are more legible with simple astigmatism than with a corresponding spherical error, and moreover that indistinctness of the vertical elements of letters causes greater confusion than blurring of the horizontal, and therefore horizontal ametropia gives worse vision than vertical. Hence many patients are inclined to accept a + cylinder axis horizontal whether they need it or not. Bull does not think the letters in Snellen's types are suited equally well for all varieties of refractive errors. He would prefer the addition of such letters as S, Q, K, Y, and italics, etc.

The author also applied a photographic test, to determine if an astigmatic eye focuses for the mean point between its two principal foci, or if it focuses for one p. f., or alternately for both, and the result corresponding to alternate focussing proved immensely superior.

The result of overlapping diffusion circles on the different letters is also well described. For example in the letter O the central light area gradually gets smaller and smaller, until finally, when the shadows overlap the centre, the letter now looks like a dark spot, with an indistinct zone around it.

The author then proceeds to show that in the case of the eye, even where there is no astigmatism, the diffusion circle is not a disc of evenly diffused light, but that the light is concentrated at some points and diminished at others, the effect differing in each individual case and depending on the "star"-like image produced chiefly or altogether by the lens sectors. A number of examples are given, proving this by comparison of the "star" with the multiple images of a point or line when seen out of focus. In each case the polyopia or diplopia corresponded with the brightest points of the star. By taking photographs with a lens cut in sectors, the author succeeded in obtaining very good imitations of monocular polyopia. Monocular diplopia he thinks should be called, *the diplopia of the sectors of the crystalline lens.*

[This paper proved most interesting to me, as several years ago (1887) I noticed in my own eyes (myopia — 3, with 0.5 cyl. 15°), a very marked monocular diplopia. I subsequently found that this was a very common condition and could be produced in any person (if not observed) by putting on low cylinders. At first I was inclined to attribute it to astigmatism. On referring to my notes I find two passages which are very striking in relation to Bull's paper: 1. "On experimenting with a bright square (1 *cm*) at 2 metres away I could see several images, but noticed that two or three images were more distinct especially one above (corresponding to position of phantom)." 2. "The diplopia varies with accommodation and is apparently dependent on some lens sector whose image does not coincide with the rest." It also occurred to me to try the effect of photographing with a lens cut into sectors. I am very pleased to see my ideas verified by Dr. Bull's admirable investigations.—L. W.] WERNER.

In this paper ALLEN (695) shows from experiment and observation that while the yellow, red, and violet rays irritate the eyes, the blue, green, and brown soothe. BURNETT.

STEVENS (696) calls attention chiefly, in this paper, to the variations in the comparative excursive power upward and downward of the eye, as observed by the tropometer. He considers these movements more important than the lateral, and that variations of the lateral frequently depend upon changes in these. The normal upward limit is 33°, the normal lower limit is 50°, the total being 83°. If one is diminished, the other is usually correspondingly increased. BURNETT.

Sections VI–XI. Reviewed by PROF. HORSTMANN.

VI.—ANOMALIES OF REFRACTION AND ACCOMMODATION.

697. HIRSCHBERG. On the change in myopia caused by removal of the lens. *Centralbl. f. prakt. Augenheilk.*, 1897, p. 65.

698. SALZMANN. The decrease in refraction following removal of the lens. *Arch. f. Augenheilk.*, xxxiv., p. 152.

699. FUKALA. The increase in acuteness of vision after myopia operations. *Graefe's Archiv*, xliii., 1, p. 206.

700. LEBER. Remarks on the acuteness of vision in highly myopic eyes. *Ibid.*, p. 218.

701. DE HAAS. The operative treatment of myopia. *Med. Weekblad*, 1897, p. 489.

702. ASCHHEIM. On a case of acquired corneal astigmatism of 32 dioptries. *Zehender's klin. Monatsbl.*, xxxiv., p. 108.

703. VISSER. The accommodation of astigmatic patients. *Nederlandsche Oogheelkundige Bydragen*, part 3, 1897.

According to HIRSCHBERG (697), the greater the original myopia, the greater the loss of action of the increased visual axis in the aphakic eye, *i. e.*, the greater the difference between the refractive condition before and after the operation. Hirschberg has done discission on 8 eyes with myopia from 15 to 26 D. The difference in refraction varied between 18 and 23 D. The greatest danger of the operation is detachment of the retina, which the author attributes to the numerous discissions which extend into the vitreous.

SALZMANN (698) shows that in removal of the lens the loss of refractive power is the greater the longer the optic axis. The deeper the anterior chamber before the operation, the less the change in refraction. The variability of the latter is due chiefly

to the displacement of the principal point, and in less degree to the length of axis, but not to the change in focal distance.

The increased acuteness of vision after myopia operations is explained by FUKALA (699) as being due to the enlargement of the retinal images, their greater luminous intensity, and the fact that the optical apparatus is simplified, the lens reflexes being done away with.

According to LEBER (700), a marked increase in vision after removal of the transparent lens, which does not depend upon enlargement of the retinal images from the action of the correcting glasses, cannot be explained by a betterment of the optic conditions, but only by some influence upon the retina.

DE HAAS (701) reports the case of a man who had been operated on for cataract twenty-six years before with resulting V = $\frac{5}{10}$. Following this the retina at the macula underwent progressive myopic changes and vision steadily decreased.

WESTHOFF.

VISSER'S (703) observations show that the majority of patients with myopic or hyperopic astigmatism accommodate, in reading, for the meridian which is emmetropic or less ametropic.

WESTHOFF.

VII.—LIDS.

704. FABER. Botryomycosis of the eyelids. *Nederlandsche Oogheelkundige Bydragen*, 1897, 3, p. 24.

705. ULCY. Epithelioma of the upper lid; blepharoplasty. *Annal. d'ocul.*, cxvii., p. 137.

706. RUMSCHEWITSCH. On the pathology of ectropion sarcomatosum. *Zehender's klin. Monatsbl.*, xxxiv., p. 1.

707. MITVALSKY. A contribution to the knowledge of the pathology of the Meibomian glands. *Centralbl. f. prakt. Augenheilk.*, 1897, pp. 47 and 73.

708. LANDOLT. A modification of the ptosis operation. *Arch. d'opht.*, xvii., 1, p. 4.

709. VAN DUYSE and RUTTEN. Double coloboma of the lids, an oculo-palpebral adhesion, and iridic anomalies on the left side. An undescribed anomaly of the lachrymal canal, and an incomplete, oblique, facial cleft on the same side. *Arch. d'opht.*, xvii., 1, p. 4.

710. DE HAAS. Membrana palpebralis perseverans. *Med. Weekblad*, 1896, p. 489.

711. SNELL. Alveolar carcinoma of eyelid. *Trans. Ophth. Soc. Un. K.*, xvi., p. 39.

712. MOWAT. Lymphangiectasis of right eyelids. *Ibid.*, p. 42.

713. OLIVER. Description of a successful operation for blepharoplasty, embracing the outer halves of both the upper and lower lids by a single split flap taken from the forehead ; for epithelioma. *Trans. Amer. Ophth. Soc.*, 1896.

714. OLIVER. Clinical history of an operation for cicatricial ectropion with advancement of the levator palpebræ muscle. *Annals of Ophth.*, April, 1897.

715. GÓMEZ, V. A case of uniocular epicanthus. *N. Y. Med. Journ.*, April 17, 1897.

FABER (704) was consulted by a peasant of thirty, who complained of a small tumor which had developed four months before in the middle of the margin of the upper lid. Since then new nodules had appeared, causing an irregular thickening of the lids. On everting the upper lid, numbers of small nodules were found, each with a small opening in its centre, through which a cloudy mucoid mass could be expressed. This mass consisted of mulberry-shaped granules composed of spherical bodies 34 μ or less in diameter. The case was one of botryomycosis, which has hitherto been found only in the horse, where it develops in the funiculus spermaticus after castration and in the breast after injury from pressure. In 1869 Bollinger found botryomycosis in a horse's lung. WESTHOFF.

In ectropium of the lower lid there is a swelling of the conjunctiva due to the proliferation of the adenoid tissue in the region of the orbital margin of the tarsus and the retrotarsal fold. RUMSCHEWITSCH (706) finds, in opposition to Wolffing, that disease of the Krause glands does not play an important rôle in bringing about ectropium.

LANDOLT (708) operates for ptosis in the following way : 1. An incision 4 *mm* from the lid margin and parallel to it. 2. Dissecting up of the skin to the orbital margin, so that the lid is separated into a deep and a superficial layer. 3. Introduction of three sutures, each with two needles, into the margin of the wound and cartilage, passing the needles under the superficial layer of the split lid and bringing them out above the eyebrows, where the sutures are knotted so as to draw up the deep layer to

the desired height. The skin of the lid hangs down over the lower margin of the lid and mostly resumes its old position after having shrunken. Sometimes the latter does not take place, and the result is unsatisfactory. Landolt therefore now puts three sutures through the superficial layer after the deep layer has cicatrized sufficiently to permit the removal of its sutures. By means of these second sutures the effect of the operation can be increased or diminished. v. MITTELSTÄDT.

VAN DUYSE and RUTTEN'S (709) patient was a male infant of ten months with a coloboma of the lids of the left eye and a cicatricial adhesion between the coloboma and the eyeball. This scar continued obliquely down the face, meeting one angle of a double hair-lip. The pupil was elongated upward and outward. v. MITTELSTÄDT.

In an infant aged three months DE HAAS (710) found the lids united by several thin tracts of skin attached to the lid margins between the cilia and the mouths of the Meibomian glands. These bands of skin were divided, and the eyes were found to be normal.

SNELL'S (711) patient, a woman aged thirty-one, noticed two years before a small pimple in the centre of the upper lid, and soon after a lump formed at the lid margin which grew slowly and painlessly and then ulcerated. Surface nodulated, yellow. Preauricular gland enlarged. It proved to be an alveolar carcinoma. WERNER.

MOWAT'S (712) patient was a boy, aged eight years. The eyelids were soft and swollen, pressure on the lower caused the upper to swell, and pressure on both produced a swelling behind the right ear. Condition first noticed three years ago. WERNER.

In OLIVER'S (713) case the upper lid was extensively torn by a blow from the horn of a cow, and the cicatrices resulting had produced a very extensive ectropion. The tissues were dissected apart, and then finally adjusted in their proper relations and sutured together. This relieved the ectropion, but there still remained a ptosis from separation of the levator palpebræ from its attachment to the tarsus. A curvilinear incision was made over the upper edge of the tarsus and the fibres of the levator carefully dissected out and loosened from the cicatricial adhesion and united by two deep sutures to the edge of the tarsus. The result was a perfect lid in appearance and movement. BURNETT.

OLIVER'S (714) case was a man of sixty-six who had an epithe-

lioma of the outer angle of the right eye, embracing both lids, and commencing in a shell wound received at that point many years ago (1864). The growth embraced nearly the whole of the outer half of both upper and lower lids. The tumor was removed and the space filled in by a flap taken from the forehead and split to form the palpebral aperture. Photographs show the operation to have been very successful. BURNETT.

The noteworthy features of GÓMEZ's (715) case are that the epicanthus was unilateral (left), and that it was due to the ravages of scleroderma. An operation relieved the deformity.

BURNETT.

VIII.—LACHRYMAL APPARATUS.

716. JÄNISCH. A case of tuberculous dacryo-adenitis. *Inaug. Dissert.*, Greifswald, 1897.

717. SÜSSKIND. A clinical and anatomical contribution to the subject of tuberculosis of the lachrymal gland. *Arch. f. Augenheilk.*, xxxiv., p. 221.

718. AHLSTRÖM. On the technique of extirpation of the lachrymal sac. *Centralbl. f. prakt. Augenheilk.*, 1897, p. 97.

719. ALT. Another case of tumor of the palpebral (accessory) lachrymal gland, including some remarks on tumors of the orbital lachrymal gland. *Am. Jour. of Opht.*, March, 1897.

720. TAYLOR, L. H. A case of foreign body in the canaliculus. *Ophth. Record*, Jan., 1897.

In an infant, aged eighteen months, whose father had tuberculosis, JÄNISCH (716) observed the development of a tumor as large as a walnut in the right lachrymal gland. The tumor when extirpated proved to be of tuberculous character. No other signs of tuberculosis could be found.

SÜSSKIND's (717) patient was a woman of twenty-one. For two years and a half she had noticed the development of a tumor in the region of the lachrymal gland, which became as large as an almond and was freely movable under the skin and not firmly attached to the bone. The preauricular glands were enlarged. The tumor and the glands were removed and found to be tuberculous, the disease having extended into the parotid gland.

In extirpating the lachrymal sac, AHLSTRÖM (718) makes an incision 4–5 *mm* long through the anterior wall of the sac, and introduces the head of a hammer measuring 8 x 5 *mm*. This renders the wall of the sac tense and facilitates the extirpation.

The patient who furnished the specimen described by ALT (719) was a negro of twenty-nine years, who had noticed a lump at the outer side of the left eye for the first time four years previously. It was found to be a tumor of the accessory lachrymal gland, the orbital gland being unaffected. Examination showed it to consist of tubules of three kinds: 1. Remnants of normal glandular tissue. 2. Tubules which appeared solid and without a central lumen. 3. Tubules with wide lumen sometimes forming cyst-like cavities. Alt considers it an adenoma.

BURNETT.

In TAYLOR'S (720) case, a farmer who had been harvesting got a foreign body in the eye, which finally proved to be a wheat beard that had found its way through the upper punctum into the canaliculus, almost completely hiding itself.

BURNETT.

IX.—MUSCLES AND NERVES.

721. GRAEFE, A. The vision of strabismus patients. An ophthalmologico-physiological study. Wiesbaden, Bergmann, 1897.

722. LANDOLT. The etiology of strabismus. *Arch. d'ophtal.* xvii., 2, p. 74.

723. BERLIN. On a peculiar form of convergent strabismus, with myopia, and its treatment by means of concave glasses. *Festschr. d. Stuttgarter Aerztl. Vereins*, 1897, p. 320.

724. ZOTH. The action of the ocular muscles and the effects of paralyses. Leipsic and Vienna, Deuticke, 1897.

725. GULLSTRAND. On paralysis of the inferior oblique. *Nord. Med. Arkiv*, Jubilee volume, No. 11, Stockholm, 1897.

726. STRAUB. Congenital bilateral paralysis of lateral movement of the eyes. *Geneeskundig Tydschrift*, 1897, p. 209, and *Centralbl. f. prakt. Augenheilk.*, 1897, p. 8.

727. SPICER and ORMEROD. Recurrent paralysis of ocular nerves. *Trans. Ophth. Soc. Un. K.*, xvi., p. 277.

728. COLLINS, E. TREACHER. Paralysis of both internal recti muscles. *Ibid.*, p. 301.

729. TAY. Case of recent double ptosis with loss of convergence and weakness of internal recti; recovery. *Ibid.*, p. 302.

730. GRINSDALE. Recurrent paralysis of right third nerve. *Ibid.*, 298.

731. MacLehose. Paralysis of left external rectus; movement inward of the affected eye is associated with contraction of the orbicularis palpebrarum on the same side, and marked retraction of the left globe. *Ibid.*, p. 299.

732. Bennett, A. G. On the treatment of insufficiency of the internal recti muscles. *Annals of Ophth.*, Jan., 1897.

733. Hansell, H. F. A case of paralysis of the superior oblique in nephritis. *Amer. Journ. of Ophth.*, March, 1897.

734. Marple. Traumatic abducens paralysis complicated with facial paralysis, especially considered as regards localization. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1897.

735. Weeks. A case of injury to the motor oculi nerve followed by paralysis. *Ophth. Record*, April, 1897.

736. Wilder, W. H. Unilateral reflex iridoplegia. *Annals of Ophth.*, April, 1897.

737. Harlan, G. C. The pupil reflex in absolute blindness. *Trans. Amer. Ophth. Soc.*, 1896.

738. Colburn. Strabismus due to undeveloped or contracted check ligament, and operation for its relief. *Ophth. Record*, Jan., 1897.

739. Haynes, W. H. Recurrent ptosis. Report of a case with anæsthesia of supra-orbital branch of the fifth cranial nerve. *N. Y. Med. Journ.*, Feb. 13, 1897.

Landolt (722) seeks in his paper to give a comprehensive account of the development of strabismus, and to separate the actual from the doubtful or merely apparent causes. Among the former are, particularly, disturbances of binocular vision and anomalies of refraction, while disturbances of central innervation of the symmetrical muscular movements are rarer causes, and the muscle theory is unwarranted, although lack of harmony between retina and muscular apparatus, too great distance between the centres of rotation, abnormal divergence of the orbits, and a large angle α facilitate the development of squint.

v. Mittelstädt.

Berlin (723) reports a series of cases of convergent squint with myopia. The patients were between seventeen and twenty years of age, and were of either sex. The myopia was 5. or 6. D. The patients had never worn concave glasses. There was homogeneous diplopia noticeable only at a certain distance.

When concave glasses were worn the diplopia disappeared. Berlin refers this variety of squint to overstraining in near work. It is cured by wearing the proper myopic correction.

GULLSTRAND (725) reports two new cases of isolated paralysis of the inferior oblique. One patient, a boy of ten, had reduced vision from corneal scars; but the author, by his objective method, determined that there was paralysis of the right inferio oblique.

In the other patient, a teacher, there was, when looking up and to the right, vertical diplopia, with the image of the left eye higher—paralysis of the left inferior oblique. Besides these two, there are only three other cases in the literature that are to be regarded as pure. In but a single case were the double images, *lege artis*, homonymous.

In three of these five cases the cause was an injury in the infra-orbital region, wherefore the author concludes that it is possible to suppose that the defect in motility did not depend upon a paralysis, but upon elastic traction from cicatrices in the loose tissue of the orbit. SCHIÖTZ.

The author's (727) seven patients were all young, two to sixteen years of age. In three the third nerve was alone affected. All were accompanied by more or less headache and vomiting with the attacks. In one there was pallor of the optic nerve, and in another contracted fields. Twenty-nine recorded cases are tabulated. In some there is a family history of migraine, but none of the patients had scotomata or spectra with the headaches. Three cases revealed, post mortem, plastic exudation at the base of the brain, fibro-chondroma of the nerve, and tubercular disease of the nerve, respectively. Dr. ORMEROD had seen cases of paroxysmal headache followed not by ocular paralysis, but by œdema and ecchymosis of the eyelid. WERNER.

COLLINS'S (728) patient, aet. twenty-two, suffered from sick headache; he never had syphilis. Both internal recti were paralyzed. He recovered completely in some months' time under KI. WERNER.

BENNETT (732) has treated 46 cases of exophoria by prism exercise after the manner recommended by Gould. Of these 30 are apparently cured, and 9 benefited more or less.

BURNETT.

In HANSELL'S (733) case a man thirty-four had a sudden paralysis of the superior oblique on the left side. There was no

history of syphilis, but an examination of the urine showed albumen and casts, which, however, disappeared later under diet and treatment. There was no disturbance in the eye grounds.
BURNETT.

MARPLE'S (734) case was a man of thirty-five who was struck on the head and remained unconscious for 5 days. On recovery there was paralysis of the right abducens and the facial on that side. A year after the accident the condition was practically the same. A résumé of other published cases is appended to the history. BURNETT.

WEEKS (735) reports a case where a man was struck by a fencing foil on the nasal process of the superior maxillary bone, not implicating the soft tissues of the orbit. Total paralysis of the third pair on that side immediately followed. There was no headache or other general symptoms. In a little over a month and a half the function of the muscles was completely restored. Weeks thinks the lesion situated at the sphenoidal fissure, a blood clot probably, which was absorbed. BURNETT.

WILDER (736) reports two cases of iridoplegia, one in a woman and the other in a man, both in the right eye in which there was at the same time a paresis of A. The pupils while not responding to the stimulus of light, promptly acted under the use of accommodation and convergence. There was no history of syphilis in either case. The eyes were otherwise normal as to their structure, but there were refractive errors. BURNETT.

HARLAN (737) instances four cases of absolute blindness in which the pupil remained large and motionless when exposed to ordinary light, and that from the ophthalmoscopic mirror, yet contracted when exposed to a strong light, particularly sunlight. BURNETT.

COLBURN (738) reports four cases of strabismus due not to anomalies of the muscles, but to faulty development of the static soft structures—that is, a contracted or undeveloped cheek ligament restraining the abductors in their attempt to produce parallelism or rotate the eyes through the entire lateral range. The operation consists in first carefully dividing the tendon, leaving a few fibres above and below, then dividing the check ligament outside of the muscle freely, and if necessary advancing the opposing muscle. The steps of the operation are illustrated by diagrams. BURNETT.

HAYNES'S (739) case was a boy of seven, with the history of no disease or dyscrasia except a mild attack of measles when six

months old. Two months later occurred the first attack of ptosis on left side. When two years old another attack; when five another; at six another, and milder attacks since. He has now mild paresis of all the muscles supplied by the third pair of left eye. BURNETT.

X.—ORBIT AND NEIGHBORING CAVITIES.

740. SCHREIBER. Report of three cases of orbital tumor removed by Kronlein's osteo-plastic method. *Report of Schreiber's Eye Institute*, at Magdeburg, for 1896.

741. VALUDE. Recurrent orbito-palpebral hæmatoma in a hæmophile. *Annal. d'ocul.*, cxvii., p. 190.

742. PIQUÉ. A case of pulsating exophthalmus. *Soc. de chir. de Paris*, Feb. 10, 1897.

743. SCHIMANOWSKY. The question of pulsating exophthalmus. *Wjest. Ophth.*, xix., 1, p. 1.

744. LEJORS. Exophthalmic goitre. *Soc. de chir. de Paris.* Feb. 10, 1897.

745. JOUNESCO. Complete bilateral resection of the cervical sympathetic in the treatment of exophthalmic goitre. *Ann. d'ocul.*, cxvii., p. 161.

746. CANT, W. E. Cyst of the orbit. *Trans. Ophth. Soc. Un. K.*, xvi., p. 171.

747. WILLIAMSON, R. T. Remarks on the prognosis in exophthalmic goitre. *Brit. Med. Journ.*, Nov., 1896, p. 1373.

748. TILLEY, H. Remarks on the operative treatment of a case of double frontal sinus empyema, complicated by double antral suppuration. *Ibid.*, Jan. 23, 1897, p. 197.

749. WEEKS. Actinomycosis of the orbit and eyeball, occurring in a parrot. *N. Y. Eye and Ear Inf. Reports*, Jan., 1897.

750. JENNINGS, J. E. A case of scirrhotic carcinoma of the orbital lachrymal gland. Microscopic examination by A. Alt. *Amer. Journ. of Ophth.*, April, 1897.

751. BULLER. The treatment of dermoid tumors of the orbit. *Trans. Amer. Ophth. Soc.*, 1896.

752. SATTLER. Ivory exostosis of the orbit. *Trans. Amer. Ophth. Soc.*, 1896.

753. ALT. A case of endothelioma of the dura mater and brain. *Amer. Journ. of Ophth.*, Jan., 1897.

754. PARK, J. W. Anophthalmus. *Ophth. Rec.*, Jan., 1897.

VALUDE's (741) patient, a bleeder of thirty-four, exhibited a swelling of the right eyelids which soon extended to the cheek and forehead. The patient at this time complained of pain at the upper-inner angle of the orbit, where two days later ecchymoses appeared, which extended to the lower lid. The condition was improving, when ten days later the swelling began to increase. Puncture of the orbit revealed the presence of pure blood. These hemorrhages recurred, but had no relation to the menstrual periods, which were regular. SULZER.

SCHIMANOWSKY (743) observed pulsating exophthalmus in a woman of fifty-two who had fallen backward three months before, striking the occipital region and causing hemorrhage from the nose and mouth (fracture of the base). The exophthalmus came on six weeks after the injury, and was accompanied by annoying sounds in the head. Vision normal; divergent strabismus; crossed diplopia; exophthalmus of the left eye, which is displaced downward and outward, and its motility upward and inward diminished. The conjunctival vessels are injected; the left cornea is dull; the left pupil dilated. Light reaction normal. The eye pulsates synchronously with the heart; the angular vein is dilated and pulsating. In the upper-inner angle of the orbit can be felt a pulsating tumor half as large as a pigeon's egg, which is in connection with the angular vein. Pressure on the left common carotid stops the pulsation and bruit and the subjective sounds. The left common carotid was ligated in the trigonum caroticum, immediately after which the exophthalmus diminished, and in two days all the symptoms had disappeared. Six days after the operation all the symptoms returned, but gradually diminished. The final result was only a partial success. The symptom complex in these cases is directly due to rupture of the carotid in the cavernous sinus. In future cases the author will not tie the carotid, but will undertake to ligate the upper orbital vein, which he believes to be feasible.

HIRSCHMANN.

LEJORS (744) records a case of Basedow's disease in which death followed some hours after extirpation of the right lobe of the thyroid gland. No cause could be found for the sudden death as the operation was done without any complications. So far 29 fatal cases have been recorded and in the other cases disturbing symptoms have been frequently observed just after the operation.

SULZER.

The favorable but incomplete results of partial resection or cut-

ing through the cervical sympathetic in Graves's disease have led Jounesco (745) to undertake its complete bilateral resection. An incision through the skin beginning at the mastoid process and following the margin of the sterno-cleido-mastoid to the clavicle, gives access to the jugular vein which is ligated in two places and divided. The exposing of the posterior margin of the sterno-cleido-mastoid necessitates cutting the branches of the cervical plexus. The trunk of the cervical sympathetic must be sought for in the middle of the region of operation. The isolated nerve trunk serves as a guide for finding the upper, middle, and lower cervical ganglia. In three of his six operations the author was forced to omit the resection of the lower ganglion. The removal of the upper ganglion immediately brings about contraction of the pupil and congestion of one half the face and secretion of saliva and tears. These symptoms soon pass off and the results of the operation are trivial. Among the six patients two had Basedow's disease. The resection of the sympathetic led in both cases to the disappearance of the exophthalmus, with decrease in size of the thyroid and a slight lessening of the frequency of the pulse. SULZER.

CANT'S (746) patient, a man aet. twenty-four, had a protruding eye from boyhood; never any pain. There was a fulness in the temporal fossa which was elastic, and transmitted pressure to a solid projection above the eyeball, which proved to be the lachrymal gland. The cyst contained a clear brown fluid. The outer wall of the orbit was wanting. After incision, drainage, and cautery, the cyst closed up in two years.

Argyll-Robertson stated that a friend of his adopted the plan of introducing a small piece of solid silver nitrate into these orbital cysts, to cause sloughing of the walls. WERNER.

WILLIAMSON (747) followed up 32 cases of this disease with this result:

Fatal,	6 cases.
Recovery,	5 "
Recovery almost complete,	2 "
Improvement considerable,	5 "
(duration of disease 2 to 9½ years)	
Slight improvement	7 cases
(1 to 7 years' duration)	
Condition much the same	6 cases
(2 to 9 years' duration)	

1 patient alive at end of seven years; condition not known.

WERNER.

The tumor removed from the orbit of a parrot and examined by WEEKS (749) showed a structure very much like that of a sarcoma with round and spindle cells. In this there were many small yellowish masses in the centres of which were minute fibrillæ, the hyphæ of actinomyces and many granules. Radiating from those a multitude of club-shaped bodies were seen, the conidia of actinomyces. The growth returned in six weeks, and there was a tumor developed in the other orbit and also one on the leg. No other tumors were found on post-mortem. This is the first recorded case of this disease in birds. BURNETT.

The patient from whom this specimen (750) was removed was a woman forty-five years old who first noted a protrusion of the right eye 12 years ago, which has slowly increased ever since. At time of examination V in R $\frac{6}{60}$, ocular movements good. A hard tumor felt in the upper portion of the orbital cavity. O. D. dull gray surrounded by a patch of choroidal atrophy. The tumor in its capsule was easily dissected from the tissues surrounding it. The tumor on examination showed itself to be a scirrhus carcinoma of the orbital part of the lachrymal gland. It was 1½ inches long and an inch thick, with a dense capsule. Some remnants of the lachrymal gland were still visible. BURNETT.

BULLER (751) dissected out a dermoid tumor from the upper-inner edge of the orbit and wounded the tendon of the oblique. After that he abandoned dissection and now simply evacuates the sac, washes it out well, and introduces a piece of nitrate of silver which dissolves and destroys the lining membrane. The result in the case was a perfect cure, with good motility of the eye. BURNETT.

SATTLER'S (752) case was that of a healthy young man of twenty-five who, three years before he applied for treatment, had noticed a hard nodular projection under the upper and inner margin of the orbit. The eye when seen was pushed forward, down, and outward. Vision good. There had been no pain or other symptoms pointing to involvement of the sinuses, yet when the mass was removed both the frontal and ethmoid cavities were found filled with a glairy mucus. The bony mass removed weighed 15.3 grams.

The case which ALT (753) reports was a woman of sixty-four who had symptoms of an intra-cranial tumor, whose eye symptoms were a right-sided facial paralysis, exophthalmos, myosis, and atrophy of the optic nerve quite far progressed on the right side.

The tumor was found, post mortem, to be basal and involved the origin of several of the cranial nerves. It had entered the orbit slightly through the sphenoidal fissure. On examination it proved to be a rare form of endothelioma. BURNETT.

PARK (754) reports a case in which he was not able after the most careful examination to find the least trace of an eyeball in the orbit of a child two weeks old. Eyelids adherent at margin leaving only $\frac{1}{8}$ of an inch open. Canaliculi absent also.

BURNETT.

XI.—CONJUNCTIVA, CORNEA, SCLERA, ANTERIOR CHAMBER.

755. COPPEZ. An attempt at a classification of grave infectious forms of conjunctivitis. *Ann. d'ocul.*, cxvii., p. 57.

756. MORAX. Subacute conjunctivitis. Clinical and bacteriological study. *Ibid.*, p. 5.

757. DE VOGEL. Bacilli of conjunctivitis. *Nederl. Oogh. Bydragen*, 3d Afl., p. 54, 1897.

758. AXENFELD. On chronic conjunctivitis caused by diplobacilli. *Centralbl. f. Bacteriol.*, xxi., p. 1.

759. BERNSTEIN. Blennorrhoic conjunctivitis of the newborn complicated with multiple arthritis. *Centralbl. f. prakt. Augenheilk.*, 1896, p. 84.

760. FEDOROW. The anatomy of follicular inflammation of the conjunctiva with reference to the normal structure of the latter. *Inaug. Dissert.*, Moscow, 1896.

761. SCHLEICH. The nature of spring catarrh. *Festschr. d Stuttgarter ærztl. Vereins*, 1897, p. 354.

762. DABNITZ. A case of spring catarrh and eczema of the skin. *Inaug. Dissert.*, Greifswald, 1897.

763. SCHIMMELPFENNIG. On a case of infantile conjunctival xerosis with kerato-malacia. *Graefe's Archiv*, xliii., 1., p. 41.

764. BRONNER. Tubercular growths of the conjunctiva. *Trans. Ophth. Soc. Un. K.*, xvi., p. 49.

765. GUNN. Acute bullous eruption with associated affection of the conjunctiva. *Ibid.*, p. 45.

766. BURNETT, SWAN M. Papilloid growth on the bulbar conjunctiva. *Amer. Journ. of Ophth.*, Apr., 1897.

767. NOYES. Pemphigus of the conjunctiva. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1897.

768. BOECKMANN, E. The operative treatment of pterygium. *Journ. Amer. Med. Assoc.*, Jan. 6, 1897.

769. HOTZ. Four cases of Thiersch's skin-grafting for pterygium. *Annals of Ophth.*, Jan., 1897.

Under the name "subacute conjunctivitis" MORAX (756) describes a frequent form of conjunctivitis that is caused by a specific diplo-bacillus. The disease is milder than the acute epidemic conjunctivitis caused by the Weeks bacillus, and resembles the conjunctivitis caused by the pneumococcus. The diplo-bacilli, which often assume the form of a chain, are distinguished from the pneumo-bacillus by the absence of a capsule and by a more typical bacillary form. The micro-organism is found both in the cells and free in the secretion. It does not stain by Gram's method. SULZER.

The infant of a mother with leucorrhœa was attacked on the fifth day, as BERNSTEIN (759) reports, with blennorrhœa neonatorum. Gonococci were found in great numbers in the secretion. Five days later the right wrist became inflamed, and then the right knee joint. The blennorrhœa and the affection of the joints lasted a month.

FEDOROW'S (760) conclusions are as follows: 1. The conjunctiva of the embryo and the new-born has no adenoid structure and contains no lymph follicles. 2. The conjunctiva of the adult contains diffuse and focal leucocytic infiltrations and also lymph follicles, which are to be considered physiological. 3. The normal conjunctival follicle develops from accumulation of cells (young tissue-elements, the appearance of retoblasts, the formation of a reticulum, further development of the cells). 4. The normal conjunctiva contains, among the tubular and acino-tubular glands, the follicular glands of Manz. 5. The mucous or goblet cells of the normal conjunctiva are found both on the surface and in the depressions of the membrane, even in the new-born; their development and function seem to be identical with those of the goblet cells of the intestinal epithelium. 6. A sharp distinction must be made between lymph follicles and simple accumulations of lymphoid cells. 7. The view that trachoma follicles arise from the leucocytes of an inflammatory infiltration, rests upon imperfect observation. 8. To consider the trachoma granule as a granuloma belies its anatomical structure. 9. All forms of follicular inflammation may be grouped into two classes: Inflammation with the formation of pseudo-follicles, and inflammation with true follicles. In the first class belong the folliculosis from spasm of accommodation and incorrigible hyperopia, atropine granulations, and some forms of subacute conjunctivitis.

In the second class belong follicular catarrh and trachoma, which are but different grades of the same affection. 10. Follicular catarrh as well as trachoma leaves scars. 11. Folliculosis of the conjunctiva is merely the becoming visible of the normally present follicles. 12. The trachoma follicle is identical in structure with the lymph follicle. 13. The passing of the trachoma follicle occurs through softening and absorption of its contents. 14. The softening of the trachoma follicle is an anæmia-necrosis of its cells. The entire course of trachoma formation and disappearance is complicated, at times, with an acute inflammation, which then preponderates. 15. Ulceration of the trachoma granulations is an inflammatory complication. 16. Anatomically, trachoma is a formation of lymph follicles in the conjunctiva leading to cicatricial degeneration. 17. Etiologically, trachoma is probably an independent disease. The superficial epithelial changes in the trachomatous conjunctiva are in intimate relation with the follicle formation in the subepithelial tissue, and consist chiefly in destruction of the epithelial cells from the immigration of leucocytes. 18. The replacing of the mucous-membrane epithelium of the conjunctiva by epidermoidal epithelium is a result of the cicatricial degeneration, and indicates a total destruction of the conjunctival tissue. HIRSCHMANN.

In many cases of spring catarrh SCHLEICH (761) was able to discover a disturbance of general nutrition which consisted in anæmia with swelling of the lymph glands and leucocytosis.

DABNITZ (762) observed a case of spring catarrh complicated with a chronic eczema of the skin which followed the course of the ocular affection, becoming exacerbated in the warm season of the year and diminishing in the winter.

In an infant eighteen days old, with diarrhœa, SCHIMMELPFENNIG (763) observed conjunctival xerosis with keratomalacia. A microscopic examination revealed a necrosis and fatty degeneration of the superficial layers of conjunctival epithelium and the same condition in all the layers of the corneal epithelium. Since many cocci were found these must be supposed to have caused the condition, but since no cocci were found in the vessels the infection was doubtless ectogenous.

BRONNER (764) records the case of a girl aged sixteen with tubercular disease of the nares. A red flat growth appeared on the conjunctiva of lower lid, which recovered after removal and scraping. It contained nodules with large giant cells but no caseation. There was never any ulceration. WERNER.

GUNN's (765) patient, a man aged twenty-five, had suffered three months before from a general bullous eruption with febrile symptoms. There were marginal cicatricial bands in the palpebral conjunctiva and ptosis of the left upper eyelid due to anchyloblepharon. During the bullous eruption a large vesicle was seen on the palpebral conjunctiva of the left eye, and one formed on the lower buccal mucous membrane. WERNER.

BURNETT (766) describes and figures a growth on the bulbar conjunctiva to the outer side and slightly above the corneal margin. It was about 1 *cm* in diameter. It consisted of a number of fine blood-vessels arranged radially around a central vessel. The ends of the vessels terminated in loops and on some a series of loops ran back towards the centre. It was removed by severing its pedicle. An examination showed it to consist of blood-vessels and epithelium mostly; the epithelium being squamous on the surface and becoming columnar as it approached the vessels at the deeper parts. BURNETT.

The principal feature of interest in NOYES's (767) case of pemphigus of the conjunctiva—which was typical in its clinical characteristics—is the failure of all the operative means employed for the relief of the condition. He tried a flap of the conjunctiva moved over from the sounder parts to cover the denuded surface after separation of the ball and lid, a flap of skin taken from the arm, and a flap of skin with a pedicle taken from the temple. In every case adhesions reformed, and the condition was even rendered worse. The man was an Italian of forty-eight years. BURNETT.

The operation for pterygium put forth by BOECKMANN (768) is what he calls reposition, in which the head of the growth is carefully dissected from the surface of the cornea and from the sclera to a short distance from the corneal border. The episcleral tissue over the space is now carefully dissected off, and the head of the pterygium which being loosened easily retracts outside the cornea, and is united to the conjunctiva with sutures. The theory of the operation is that the firm union between the head of the growth and the sclera will prevent its further encroachments on the cornea. BURNETT.

HOTZ (769) reports a number of cases in which he has filled in the space left after the excision of large pterygia by grafts from the skin behind the ear. He makes the graft a little smaller than the denuded space, in the horizontal direction. Both eyes are

bandaged for 48 hours. In four reported cases there was but one failure. BURNETT.

770. RANVIER. The physiological rôle of leucocytes in wounds of the cornea. *Ann. d'ocul.*, cxvii., p. 194.

771. KOSOW. The treatment of purulent keratitis with eserine, and the prevention of corneal complications in blennorrhœa. *Wojenn. Med. Journ.*, Nov. 1, 1897.

772. GREEFF. Interstitial keratitis in its relation to general diseases. *Samml. zwangl. Abhd. a. d. Geb. d. Augenh.* Edited by Vossius, i., 8. 1897.

773. KLEIN, S. Keratitis hypotonica. *Ungarisch med. Presse*, Nov. 10, 1897.

774. RANVIER. On cicatrization and the rôle of the anterior epithelium of the cornea in the case of wounds of that membrane. *Acad. des Sciences*, Dec. 28, 1896.

775. SULZER. On the rôle of the cornea in the production of the differences existing between the corneal astigmatism measured by the aid of the ophthalmometer, and the total astigmatism. *Ann. d'ocul.*, cxviii., p. 123.

776. SCOTT, K. Keratitis occurring in leprosy. *Trans. Ophth. Soc. Un. K.*, xvi., p. 51.

777. FROST. Annular opacity of the cornea (with plate). *Ibid.*, p. 53.

778. BATTEN. Conical astigmatism, and staphyloma of the sclerotic as a cause of astigmatism. *Ophth. Rev.*, xvi., p. 1.

779. DUNN. A case of iritis with deposits in the cornea resulting in sclerosis and change of the normal surface of the cornea. *Annals of Ophth.*, Jan., 1897.

780. GREEN and EWING. Hypopyon-keratitis. Break in Descemet's membrane preceding corneal perforation. *Trans. Amer. Ophth. Soc.*, 1896.

RANVIER'S (770) interesting paper contains a detailed account of the cellular processes occurring in the healing of superficial wounds of the cornea.

According to GREEFF (772) interstitial keratitis attacks persons below the age of forty, females more frequently than males. It usually depends upon hereditary syphilis and occasionally upon acquired. Next to syphilis the most frequent cause is tuberculosis, and rheumatic influences also may bring it about. There

is doubtless some connection between interstitial keratitis and malaria, diabetes, influenza, and affections of the female genital organs.

The affection termed keratitis hypotonica by KLEIN (773) has long been known and consists in a relatively slight infiltration of the cornea with marked irritation. The tension is greatly diminished. The cause of the decreased tension is a corneal fistula through which the aqueous humor trickles. With the closure of this opening, for which purpose Klein advises the use of the thermo-cautery, improvement is obtained and the condition is sometimes cured. HERRNHEISER.

RANVIER (774) has made new experiments in regard to the regenerative processes in the corneal epithelium. When a rabbit's cornea is superficially incised, after 24 hours the margins of the wound are found to be gaping and the wedge-shaped defect filled with epithelial cells. Along the edges of the wound, the height of the epithelial layer is diminished one half. The middle layer, the layer of cubiodal cells, has more or less completely disappeared, and the cylindrical cells have grown broader though their height is less. These changes are not of an irritative nature. Immediately after the injury the cut margin of the epithelial layer is sharp. Four to six hours later a cellular process appears at each margin gradually pushing out until the defect is filled with epithelial cells of irregular shape and having large nuclei. These cells have the appearance of being over-nourished and this effect is probably attributable to the leucocytes which collect about the wound, their nuclei dividing, their protoplasm breaking down and nuclei being fully set free for the nutrition of other cells.

The epithelial cells filling the defect are such as have wandered from the epithelial layer at the margin of the incision. There is nothing to indicate that the filling of the defect comes about through the division of the cells. The process is merely one of immigration. SULZER.

SCOTT'S (776) first patient suffered from anæsthetic leprosy for three years. There was nearly complete facial paralysis, and inability to close the eyes. The lower two thirds of the corneæ were occupied by diffuse infiltrations, with groups of small papillæ, semi-transparent and solid-looking. Pericorneal injection moderate. In the second case, which was neglected, the whole cornea was similarly affected, and the conjunctiva was thickened, inflamed, and ulcerated. WERNER.

In FROST'S (777) case the condition dated from infancy. The

circular opacity was almost central, the enclosed area being slightly hazy. WERNER.

BATTEN (778) records two cases, one of wound in the ciliary region, and the other due to scleritis, in which the shadows in retinoscopy were not parallel in one meridian but inclined to one another on the side where the sclerotic was weakened. He believes the distortion of the cornea may be often due to staphyloma of the sclerotic. WERNER.

DUNN'S (779) case seems to be one similar to those reported by Kniess and some others, where the substance of the cornea was swollen from entrance of fluid through the membrane of Descemet, underwent changes, and caused limited and sharply outlined opacities. It began as a keratitis punctata in a syphilitic subject. In this case the form of the cornea was very much changed. BURNETT.

GREEN and EWING (780) give the histological pictures found in an eye enucleated for keratitis due to an exophthalmus and orbital tumor. These show that the hypopyon, which was a prominent feature in the clinical aspect of the case, was due, in this instance at least, to a break in Descemet's membrane and not as Leber has shown, in other instances, to a secretion of pus from the iris angle. BURNETT.

781. ROGMAN. Serous cyst of the sclera. *Ann. d'ocul.*, cxvii., p. 115.

True cysts of the sclera are very infrequent. To the small number already reported, ROGMAN (781) adds another. In a girl of thirteen, a tumor which appeared immediately after birth, had steadily grown larger. It was 8 *mm* long and 2-5 *mm* broad, resting on the sclera and adjoining the inner-lower quarter of the cornea. Puncture showed that the tumor was a cyst, containing a clear fluid and having no connection with the anterior chamber. The anterior wall of the cyst presented on its outer surface the epithelial covering of the conjunctiva, and just beneath it thick tracts of connective tissue and numerous elastic fibres. The deeper layers were formed of thin bundles of connective tissue.

Sections XII.–XXI. Reviewed by DR. P. SILEX.

XII.—IRIS.

782. GOLDZIEHER. Demonstration of a case of bilateral absence of iris, together with ectopia lentis and absolute glaucoma. *Ung. med. Presse*, 1897, No. 13.

783. CARGILL, L. V. Gumma of the ciliary body. *Brit. Med. Journ.*, Jan. 2, 1897, p. 17.

784. HIGNETT, H. C. A case of gumma of the ciliary region. *Ibid.*, Nov., 1896, p. 380.

785. EALES and SINCLAIR. Uveal cyst of the iris. *Trans. Ophth. Soc. Un. K.*, xvi., p. 56.

GOLDZIEHER (782) explains the glaucoma in his case of bilateral aniridia and ectopia of the lens by supposing that the lenses dislocated downward caused a disturbance in the lymph circulation, through pressure. HERRNHEISER.

CARGILL'S (783) patient, æt. twenty-four, had a chancre ten months before the eye was seen. There was a dark red bulging of the sclera below and corresponding to it a reddish, yellow cauliflower-like growth in the anterior chamber. T — 2. V = p. l. The condition disappeared with mercurial treatment. Some discoloration of the sclerotic remained. Eyeball slightly shrunken in. Pupil excluded. A reference to literature of subject follows. WERNER.

HIGNETT'S (784) patient, a Malay æt. thirty, contracted syphilis two and a half years before the eye became affected. There were two reddish-purple bulgings of the sclerotic, opposite two reddish-yellow tumors in the anterior chamber. T+1. Ciliary tenderness. Recovered, with V= counting fingers, under mercurial treatment. WERNER.

This (785) is an interesting case of cyst of the iris formed by detachment of the posterior layer of the uvea. According to the authors, this is the first case of the kind which has been diagnosed clinically. The condition was observed by Collins and recorded in vol. xiii., R. London Ophth. Hosp. Reports. The subject of this paper was a man æt. forty-seven, who frequently got lime into his eye. When seen, the eye was glaucomatous, steamy cornea. V = no p. l. Reaching from behind the iris into the pupillary area were two dark brown globular masses, freely mobile. Movements of the eyes producing in them a fine jelly-like tremble. Their surfaces were finely creased. Microscopic examination showed that they were formed by a splitting of the posterior uveal layer of the iris. There was also ectropion of the uvea, and detached retina. The angle of the anterior chamber was closed by peripheral adhesion of the iris. WERNER.

XIII.—CHOROID.

786. LAGRANGE. A contribution to the study of metastatic ophthalmia not of microbic origin. *Arch. d'opht.*, xvii., No. 2, p. 94.

787. DARIER and ROCHON-DUVIGNEAUD. A contribution to the differential diagnosis between true and false intraocular tumors. *Ibid.*, xvii., 3, p. 183.

788. NEESE. Sarcoma choroideæ carcinomatosum seu alveolare melanoticum. *Graefe's Archiv*, xliii., p. 262.

789. MARSHALL, C. D. Detachment of the choroid. *Trans. Ophth. Soc. Un. K.*, xvi., p. 98.

790. ROCKLIFFE, C., Leuco-sarcoma of the choroid. *Ibid.* p. 49.

791. RISLEY. Detachment of the choroid and retina by concussion. *Amer. Journ. of Ophth.*, Mar., 1897.

792. LEWIS, G. G. A peculiar case of sarcoma of the choroid. *Annals of Ophth.*, Jan., 1897.

LAGRANGE's (786) patient was a child of two which, after suffering with fever, convulsions, hemiplegia, and swelling of the lower extremities, became blind in the right eye. The cornea and lens were clear, the pupil was dilated and irresponsive, and there was a white reflex from the virtreous chamber. A metastatic inflammation was suspected and the eye was enucleated. A white sero-albuminous exudation was found in the vitreous and also between the detached retina and the choroid and in the infra-choroidal space. There was also found mucoid degeneration of the retinal ganglion cells, of some connective-tissue cells in the choroid, and of the choroidal vascular endothelium. The vessels were normal, there were no accumulations of leucocytes, and no micro-organisms were found.

In the author's opinion this was a case of exudative chorioretinitis not of parasitic origin, but caused by the toxic influence of a general disease. His case is, therefore, grouped with those described by Roth and Herrnheiser, which are called "septic" and not metastatic. v. MITTELSTÄDT.

DARIER and ROCHON-DUVIGNEAUD (787) report a case of tuberculosis of the eye which apparently began in the retina, then perforated the sclera and formed a tumor 1 *cm* in diameter at the sclero-corneal junction, and was mistaken by many for a leuco-

sarcoma. The authors then proceed to state the distinguishing marks between intra-ocular tumors and the infectious neoplasms of syphilis and tuberculosis. In the former the changes remain localized to the immediate neighborhood of the tumor, inflammation is wanting, and only late do signs of glaucoma appear. In the pseudo-plasms, however, the neighboring regions are soon involved and the tension is lowered. v. MITTELSTÄDT.

NEESE (788) describes a case of sarcoma choroideæ carcinomatosum in a man of twenty-one, and gives a detailed account of the development of the opinions concerning this tumor, which Virchow classed with the carcinomas, but which Billroth and others later brought into the sarcoma group. The alveolar sarcomas are one of the most malignant forms.

MARSHALL (789) records three cases of choroidal detachment. The condition was discovered after excision. The first was due to choroidal hemorrhage after iridectomy for glaucoma. In the second there was fibrous thickening with cyst-like cavities. The third was a case of cataract extraction with subsequent leaking of the wound. The author thinks three factors necessary to cause the condition, viz.: Hyalitis with shrinking; choroido-retinitis leading to adhesions; and serous exudation between the choroid and sclerotic. The tension in choroidal detachment is always diminished. They are often lobulated.

WERNER.

The two interesting features of ROCKLIFFE'S (790) case are that the tumor was unpigmented and was seen in a very early stage. Patient, a man æt. forty-two, complained of defect in V for a month. V = $\frac{6}{36}$. No scotoma; normal fundus; reads slantingly. Two months later V = fingers at 2′; field defective above. Retina appears loose round *m. l.* In nine days detachment became very marked, extending down to periphery, with defined margin. A fortnight later the condition reached above the disc, and choroidal vessels became visible under the retina. The eye was excised, and the growth proved to be a round-celled leuco-sarcoma. The author refers to eight cases recorded in England. WERNER.

In the case reported by RISLEY (791) the trouble in the left eye began after a discharge of a gun close to the left side of the head, which deafened the patient and made him dizzy. The eye was not painful at the time. This was two years ago. At present the eye is softer than its fellow, and there is an evident

detachment of the retina conjoined with the choroid. V is totally lost. BURNETT.

LEWIS (792) describes a case in which the eye had to be enucleated for glaucomatous symptoms, associated with hemorrhages, occurring at short intervals in the vitreous and also in the anterior chamber. A small tumor the size of a buck-shot was found at the posterior wall of the eyeball, apparently starting from the choroid, but extending through the scleral wall instead of towards the vitreous, as is common, and was visible on the outside a quarter of an inch to the nasal side of the optic nerve. An examination showed it to be a round-celled sarcoma.

BURNETT.

XIV.—GLAUCOMA.

793. SULZER. Glaucoma fulminans and permanent abolishment of the retinal circulation. Considerations on the rôle of intra-ocular circulation in the pathogenesis of glaucoma. *Ann. d'ocul.*, cxvii., p. 81.

794. CZERMAK. On the doctrine of the origin and course of the prodromes and acute attacks of glaucoma.

795. GAYET. The "sclero-iridectomy" of Professor Schoeler. *Zehender's klin. Monatsbl.*, xxxv., p. 31.

796. AYRES S. C. Acute glaucoma associated with large nasal polypus; removal of polypus and relief of glaucomatous symptoms. *Amer. Journ. of Ophth.*, April, 1897.

797. ALT. Hemorrhagic glaucoma. *Ibid.*

SULZER (793) believes that the vision suffers in glaucoma less from the direct mechanical action of the increased tension on the nerve elements than from a sluggishness of the blood circulation brought about by the increased tension. The form of the defect in the field corresponds to the idea of an insufficient nutrition of the retina. The anatomical changes found in acute glaucoma are those due to blood stasis. In acute glaucoma complete blindness comes on without excavation of the disc, and in other cases there is a complete excavation with fair acuteness of vision and a visual field but slightly contracted. The excavation of the disc is a secondary affair, due to the degeneration of the nerve fibres and to the disturbed nutrition of the tissues of the disc. The cause of all these nutritive disturbances is a slowing of the circulation which may be due to various causes. The disturbance of

balance between intraocular pressure and arterial pressure is the most frequent cause of the outbreak of glaucoma in eyes predisposed to glaucoma by rigidity of the sclera and narrowing of the passages of exit. These cases may be designated as circulatory glaucoma. A second category is that in which the disturbance of circulation depends upon a primary change in the vessel wall (vascular glaucoma). Hemorrhagic glaucoma is the type of this group. Vascular glaucoma is characterized by the early and spontaneous appearance of hemorrhages in the anterior chamber, choroid, or retina. The third category, that of nervous glaucoma, consists in an affection of the vasomotor fibres of the eye. Glaucoma simplex is the most important variety. Operative interference is here likely to be followed by untoward results.

All varieties of glaucoma lead to vascular degeneration. This symptom is primary in vascular glaucoma and secondary in circulatory and nervous glaucoma. Therefore the forms are apt to be mixed, though the classification should depend upon the origin. SULZER.

CZERMAK (794) states that the flattening of the anterior chamber usually attributed to glaucoma really exists before the glaucoma, and predisposes to it. The flattening of the chamber he explains as being an excessive degree of the physiological flattening of old age, which is due to a diminished secretion of aqueous humor from the secretory parts which have undergone senile degenerative changes.

In cases of acute glaucoma there is no inflammatory adhesion between the iris and the ligamentum pectinatum, but they merely lie in apposition. The iris in these cases passes outward from its point of insertion and then bends sharply forward to lie on the ligamentum pectinatum. This condition is brought about, according to Czermak, as follows. In consequence of an excessive dilatation of the pupil when the chamber is shallow, the periphery of the iris becomes thickened until it touches the margin of Descemet's membrane. The aqueous humor then collecting forces the iris into the chamber angle. This dilatation of the pupil may be relieved naturally or by myotics, but if it remains it leads to a condition of irritation and increased tension; all the subsequent clinical signs and anatomical changes are the result of the increased tension and the consequent venous stasis.

V. MITTELSTÄDT.

GAYET (795) calls attention to the fact that as early as 1884 he

recommended cutting through the sclera with shallow incisions in cases in which the posterior surface of the cornea was united with the iris.

AYRES's (796) patient was a man of fifty-five years, who had an attack of acute glaucoma in the right eye ; V = 0. 2. Eserine was ordered, but vision was reduced to 0.1. A polypus in the right nostril was removed to insure better breathing, and immediately the eye symptoms began to improve, and vision was in a short time advanced to 0.8. Several years have now elapsed and there is no return of the glaucomatous symptoms. BURNETT.

This case, which was seen from the first by ALT (797), is described in the fullest detail and seems to throw a great deal of light as to the manner in which hemorrhages in the retina bring about secondary glaucoma. The eye came to enucleation and was examined carefully in every part, an account of which it is impossible to give here in any detail. The general conclusions, however, which seem to be justified by a careful study of the case are that the disease is primarily one of thrombosis or thrombophlebitis of the larger venous blood-vessels, which leads to rupture of their walls and an effusion of blood. Some of this blood finds its way into the vitreous and is carried by the lymph current of the vitreous to the filtration angle at the base of the iris, causing a plugging up of this space and a consequent obstruction to the exosmosis. In case the eye is hypermetropic, as it was in the present instance, the filtration angle is small and easily obstructed, and then the condition of glaucoma is readily brought about. Where H. is not present or the conditions of obstruction of the filtration angle are not so favorable, retinal hemorrhages are not so likely to lead to secondary glaucoma. BURNETT.

XV.—SYMPATHETIC OPHTHALMIA.

798. FAGE. Sympathetic ophthalmia appearing a month after the enucleation of an injured eye. *Ann. d'ocul.*, cxvii., p. 186.

799. MULDER. Sympathetic papillitis. *Nederlandsche Oogheelkundige Bydragen*, Afl. 3, p. 38.

800. NUEL. On sympathetic amblyopia. *Arch. d'opht.*, xvii., p. 145.

A man of eighteen was blinded six years before by a bit of copper entering his right eye. Six months before, MULDER (799) found that the vision in the left eye was becoming poorer. The

injured eye at this time showed perikeratic injection. L. V = $\frac{1}{4}$; papillitis, iris normal, vitreous clear. The injured eye was enucleated and the bit of copper found. No medicamentous treatment was employed. A month later the papillitis had disappeared and vision was normal. WESTHOFF.

NUEL (800) describes 16 cases of sympathetic amblyopia. In all except one, in which there had been a burn, a perforating injury had taken place, after which, often years later, amblyopia developed with partial atrophy of the nerve. The disturbance came on at a time when the injured eye was free from irritation, and even after an early enucleation had been done. The latter was of no avail when once the affection had appeared. The ophthalmoscopic picture consists in a woolliness of the disc and capillary hyperæmia. Finally there is temporal atrophy; pure atrophy was never observed. The prognosis, as compared with other sympathetic affections, is favorable. Treatment with gray ointment and rest is of value, but the effect of enucleation of the injured eye is doubtful. The origin of the affection is doubtful.

v. MITTELSTÄDT.

XVI.—LENS.

801. RANSCHENBACH. A contribution to the pathology and therapy of traumatic cataract. *Inaug. Dissert.*, Basle, 1897.

802. WETTENDORFER. A contribution to the etiology of juvenile total cataract. *Wiener med. Wochenschr.*, 1897, Nos. 11 and 12.

803. KREIWITZKI. On corneal astigmatism after iridectomy and simple linear extraction. *Inaug. Dissert.*, St. Petersburg, 1897.

804. TROUSSEAU. Treatment of hemorrhage after extraction of cataract by sclero-corneal suture. *Arch. d' opht.*, xvii., 2, p. 106.

805. MULDER. Posterior polar cataract and lenticonus. *Nederlandsche Oogheelkundige Bydragen*, Afl. 3, 41, 1897.

806. DEMICHERI. Interference rings in the cataractous lens. *Ann. d'ocul.*, cxii., p. 133.

807. DEMICHERI. *Ibid. Arch. d'opht.*, xvii., 1, p. 38.

808. SHUMWAY, E. A. Summary of operations for cataract done at the N. Y. Eye and Ear Infirmary from Oct., 1895, to Oct., 1896. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1897.

809. OLIVER. Clinical history of a case of subconjunctival dislocation of the crystalline lens. *Ophth. Record*, June, 1897.

810. WILSON, F. M. Senile cataract. *Trans. Conn. Med. Soc.*, 1895.

811. COOVER, D. H. An interesting but disastrous termination of a cataract operation. *Ophth. Record*, March, 1897.

RANSCHENBACH (801) records ninety-one cases of traumatic cataract seen in the Basle clinic. In the great majority of cases the cornea, and perhaps also the adjoining sclera or the iris, are perforated and the lens capsule is injured. The fate of the eye depends upon the infectious or aseptic nature of the penetrating body, upon the extent of the injury, and upon the parts involved. In the young, spontaneous absorption should be waited for. In general, operative procedures are to be postponed while inflammatory symptoms still exist, provided that there are no pressing indications for operation, such as the occurrence of glaucomatous attacks. The later the operation is done the better the course of healing, and the greater the percentage of cases recovering useful vision. In general, the prognosis is bad, the resulting acuteness of vision seldom being above $\frac{1}{10}$.

WETTENDORFER (802) describes a case of severe idiopathic tetanus in a man of twenty followed by cortical punctate and linear opacities in both lenses. Two other cases of cataract following tetanus have been reported, both being of the zonular variety. In other spasmodic neuroses, such as epilepsy and the like, the occurrence of soft cataract is well known. The question whether the cataract stands in relation to the spasm of accommodation which occurs in tetanus, the convulsions of ergotism, and other general spasmodic conditions, is left open by the author.

The measurements were made with the Javal ophthalmometer. The final results, according to KREIWITZKI (803), are the same as those after peripheric extraction but of lesser degree. After iridectomy for glaucoma, the direction of the meridian of greater curvature is at times reversed, the refraction of the meridian in the direction of the coloboma being diminished. HIRSCHMANN.

TROUSSEAU (804) in two cases of intraocular hemorrhage after extraction put in a sclero-corneal suture. In the first case, the hemorrhage had persisted for some time. Nevertheless enucleation was rendered unnecessary and an atrophic ball was retained. In the second case, a severe hemorrhage appeared immediately

after the eye was bandaged, and since the bandage did not check it, a suture was introduced which stopped the bleeding. An eye was preserved of natural size and form, and free from pain.

V. MITTELSTÄDT.

DEMICHERI (806) saw Newton's rings appear when an opaque lens reflected lamplight. In one case this interference phenomenon was observed in the capsule remaining in the anterior chamber after extraction. In order to explain these appearances, one must suppose an alteration in the superficial layers of the lens causing a change in refractive index. The lens capsule then acts like a thin plate of glass separating two media of different refractive index. SULZER.

DEMICHERI (807) observed in a cataract opaque to the capsule, the appearance of colored rings in the pupil. The centre appeared bluish-black, then followed green, yellow, and finally red. The yellow appears as a narrow line. The colored rings had not sharp outlines, but were undulatory and iridescent.

V. MITTELSTÄDT.

Of the 181 cases of cataract operations done at the N. Y. Eye and Ear Inf. (808) 128 were senile; 10 sclerosed lenses; 16 traumatic; 6 congenital; 7 soft; 14 complicated. Panophthalmitis occurred twice, and intra-ocular hemorrhage three times. Mental disturbance occurred in eight cases, there being a history of previous mental trouble in five. Simple extractions, 70%; with iridectomy, 21.67%; linear with needlings, 3.33%; through a previous coloboma of iris, 5%. Prolapse of iris occurred in 9.43%, on an average, 2.4 days after the operation. The average immediate recorded vision was $\frac{25}{100}$ +, the average ultimate vision $\frac{2}{10}$ —. Of ultimate vision, 0.1 in 2.85%; $\frac{1}{5}$ in 9.28%. In five cases no vision was looked for. BURNETT.

OLIVER'S (809) case was a woman of thirty-four years who fell and struck herself on the right eye. There was a rupture of the sclera in the upper ciliary region, in which the lens could be seen plainly to lie. Iris retracted and tremulous. The overlying conjunctiva was incised and the unincapsulated lens evacuated. The scleral wound was not disturbed. It was not found necessary to put any sutures in the conjunctival wound. Vision in due time came, with proper correcting glass, to near the normal.

BURNETT.

WILSON (810) reports 100 extractions of senile cataract. He is opposed to too strong antisepsis, considering it liable to lead

to inflammation. Fifty-three cases were without iridectomy, with 5 prolapses of the iris; in 38 with iridectomy there were 3 prolapses of the iris, and 1 prolapse of the capsule. As to results; three failures and two with *p. l.* BURNETT.

COOVER (811) reports a case of extraction in a woman of seventy-seven suffering from diabetes, in which sloughing of the cornea began on the second day, and a few days after a thrombosis of the tracheal artery. She died at the end of a week.

BURNETT.

XVII.—VITREOUS.

812. BLASKOVICS. Prolapse of the entire contents of the eyeball after intra-ocular hemorrhage. *Szemészet*, 1896.

BLASKOVICS'S (812) patient, a woman who had suffered from glaucoma for ten years, had a severe hemorrhage from the left eye the day before her admission. It was probably a spontaneous retro-choroidal hemorrhage which, after extruding the lens and vitreous, inverted the retina and choroid and escaped through the pupil and the perforation of the outer coat.

XVIII.—RETINA AND FUNCTIONAL DISTURBANCES.

813. MODESTOW. Pathological changes in the retina from chronic nicotine poisoning. *Inaug. Dissert.*, St. Petersburg, 1897.

814. DOR. A case of persistence of binocular vision in a case of monocular amblyopia. *Rev. génér. d'opht.*, 1897, p. 51.

815. CABANNES and ULRY. Amblyopia following a fall on the head.

816. CHOCHRJAKOW. The pathological changes in the retina in acute uræmia. *Inaug. Dissert.*, St. Petersburg, 1897.

817. SILEX. Amblyopia and amaurosis in women before and after parturition. *Monatsschr. f. Geburtshilfe u. Gynækologie*, v., 4.

818. DUCLOS. Retinal hemorrhage in the course of leucæmia. *Ann. d'ocul.*, cxvii., p. 50.

819. MOSES. A contribution to the etiology of thrombosis of the central vein of the retina. *Inaug. Dissert.*, Würzburg, 1897.

820. COLLINS, E. TREACHER. Four cases of bilateral glioma of the retina cured by enucleation of the two eyes. *Trans. Ophth. Soc. Un. K.*, xvi., p. 142.

821. LAWFORD. A case of retinitis circinata (with plate). *Ibid.*, p. 87.

822. HARTRIDGE. A case of retinitis circinata (with plate). *Ibid.*

823. RISLEY. Cyst of the right optic disc, choroiditis, and macular hemorrhage. *Trans. Amer. Ophth. Soc.*, 1896.

824. OLIVER. A clinical study of a case of double chorio-retinitis in the macular region following a flash of lightning, and a flash from burning lycopodium. *Ibid.*

825. OLIVER. Ophthalmoscopic representation of a case of traumatic rupture of the inferior temporal vein of the right retina. *Ibid.*

826. ROGERS, F. T. Report of a case of persistent retinal impression following the use of the sextant. *Ophth. Record*, April, 1897.

827. KEYSER, P. D. On subjective visual sensations. *Ibid.*, May, 1897.

828. COOK, S. E. Unusual tortuosity of the retinal arteries. *Annals of Ophth.*, Apr., 1897.

829. GRADLE. Occlusion of the arterioles supplying the macula lutea. *Ibid.*, Apr., 1897.

MODESTOW (813) poisoned rabbits with repeated injections of small amounts of nicotine dissolved in water. The retinas showed vacuole formation in the ganglion cells, dehiscence of the elements of the reticular and nuclear layers, detachment of the rod-and-cone layer from the limitans externa and of the pigment epithelium from the retina, and thickening and narrowing of the arteries. HIRSCHMANN.

DOR (814) reports a very unusual case of monocular hysterical amblyopia with preservation of binocular vision. The nineteen-year-old patient accidentally noticed that the sight of the left eye was poor, but remembered that she had previously seen well with each eye. L V = 0.1 ; R V = 0.6. The power of accommodation is reduced in the left eye ; the visual field in this eye is scarcely contracted concentrically, but there is a relative central scotoma most marked for violet, blue, and yellow. The marked micropsia of this eye in connection with the peculiar central scotoma justified the diagnosis of hysterical amblyopia, although there were no characteristic stigmata. Cold-water treatment les-

sened the vision of the right eye without improving that of the left. R V = 0.2 ; L V = 0.1. The treatment of a stomach trouble and the use of the electric douche increased the vision to R V = 0.4 ; L V = 0.8. The central scotoma became less marked ; but the field for blue suffered a concentric contraction. At this time the author noticed that the patient, when using the stereoscope, deciphered with the left eye test objects which could not be recognized when the right eye was closed. After stereoscopic exercises for a week the vision in each eye became normal, but binocular vision was impossible. She sees alternately with either eye, *i. e.*, the impression gained from one eye only is recognized.

SULZER.

CABANNES and ULRY (815) observed the following unusual case of traumatic amblyopia. A sailor of thirty-two fell on his head. Subluxation of the lower jaw. Bleeding from the nose, ecchymoses of the lids and conjunctiva of the left side. Loss of vision in the left eye for a week. Four weeks after the accident, the upper-outer portion of the field was wanting. The disc is somewhat pale. No accompanying symptoms except anæsthesia in the region of the infra-orbital nerve. SULZER.

CHOCHRJAKOW (816) ligated the ureters in a number of dogs and rabbits and killed some of them after the appearance of uræmic symptoms (second day), and some were allowed to die of uræmia (second to fourth day). In another series he removed the ligature and killed the animals at intervals, letting them live from a week to two months. The microscopic preparations of the retina were stained by the Ehrlich-Dogiel methylene-blue method. There were found general œdema of the retina, with vacuole formation in and about the ganglion cells, in the nuclear and reticular layers, in the varicose thickening of the nerve fibres and Müllers fibres, as well as swelling of the vascular endothelium and enlargement of the perivascular spaces. All these changes appeared in from 2 to 7 days and disappeared, after restoring the permeability of the ureters, within two months. Similar changes were found in the eyes of persons dead of uræmia. The author believes uræmic blindness with negative ophthalmoscopic findings to be due to the changes he describes in the retina.

HIRSCHMANN.

SILEX (817) divides the amaurosis in or following pregnancy into four groups. 1. Uræmic amaurosis without eclampsia. 2. Uræmic amaurosis with attacks of eclampsia, which may occur

before, during, or after parturition. 3. Amaurosis without uræmia (reflex neurosis?). 4. Amaurosis from various causes, such as convulsions of hysterical, epileptic, and apoplectic character. The amaurosis affects both eyes suddenly, and lasts minutes, hours, or days. It is mostly associated with eclampsia. The pupils are in some cases irresponsive, but they usually react to light even in complete amaurosis. The fundus always presents a normal ophthalmoscopic picture. The prognosis is generally good, and when vision does not soon return to the normal, a complicating retinitis may be suspected.

Moses (819), after speaking of the formation of vessel thromboses in general, records 50 cases of venous thrombosis and comes to the conclusion that it always occurs in individuals who exhibit some disturbance in circulation due to atheromatous or syphilitic thickening of the vessel walls, cardiac weakness, or general diseases such as anæmia and diabetes,—that is, it occurs in marantic persons. Spontaneous thrombosis of the central vein of the retina belongs to this group of marantic thromboses.

In a paper on glioma in the *Royal London Ophthalm. Hospital Reports*, the author (820) came to the conclusion that 3 years after the operation the fear of recurrence was practically nil. In these 4 cases more than 3 years had elapsed since the excision of the second eye. It is for the parents to decide whether they consider life worth saving on the condition of loss of sight. One eye only should be removed at a time and subjected to microscopic examination to exclude all doubts. In one case the eye although shrunken contained a gliomatous growth.

Werner.

Lawford's (821) case is a typical one occurring in a woman æt. seventy-seven. There were retinal hemorrhages at the macula in one eye, with one irregular white exudation. The other eye presented the typical appearances. Mr. Doyne had noticed peculiar "globes" with bright reflex on their surface in a case (plate vi. illustrates his case). Werner.

Hartridge's (822) patient was a woman æt. sixty-one. The appearances were somewhat similar to those of albuminuric retinitis, but no albumen was ever detected in the urine. It was probably an early stage of retinitis circinata. (The circle formed by the white streaks, as seen in plate, is larger than is usually observed in albuminuric retinitis.—L. W.)

Werner.

RISLEY (823) gives a colored drawing of a small cyst on the upper edge of the optic disc projecting 2 *mm.* into the vitreous. Below this there is the remains of a hyaloid artery.

BURNETT.

This case of OLIVER'S (824), whose history is so freely given, and illustrated by drawings, was in a young man twenty years old who had a central scotoma of both eyes, following a vivid flash of lightning and some little time after by a flash of burning lycopodium. The changes in the form of the scotoma are given in a large number of drawings by the patient, who is an artist. Ophthalmoscopically the macular region seemed slightly puffed with an irregularly flattened mass. The tissue itself did not seem to be discolored or opaque. There were no hemorrhages. The left retina was but little changed. The final outcome after many months was $\frac{5}{5}$ vision in R and V = 1 in left. BURNETT.

OLIVER (825) gives a fine chromo-lithographic picture of a rupture of the inferior temporal vein of the retina as the result of a blow on the eye from a steel projectile thrown with only moderate force against it. The hemorrhage was sub-hyaloid. There was a delicate stellate opacity at the macula. Ultimately good vision was restored. BURNETT.

In ROGERS'S (826) case of persistent retinal impression following looking at the sun through the sextant there was observed ophthalmoscopically an unusual redness of the choroid and retina around the macula, which was not seen in the other eye. The first subjective symptoms were semicircles of light revolving around a dark centre that afterwards changed to a pentagon, with correction of ametropia, V = 0.5. These conditions have remained essentially the same for several months. BURNETT.

KEYSER (827) relates three cases of hemianopsia which were brought about by the ingestion of honey as an article of diet. Every time honey was indulged in the phenomenon of half-vision presented itself; recovery of V, however, in the course of some hours, after sleep. BURNETT.

COOK (828) records the history and illustrates with a good drawing a case of very marked tortuosity of all the retinal arteries, the veins being of normal size and course. The eye was healthy and had normal vision. BURNETT.

GRADLE'S (829) patient was a man of twenty-five years who had several spells of temporary blindness in the right eye (the left was aphakic from an accident), and finally had one which was

permanent. Gradle found a central dark spot in the V F, 5° up and down and 6° laterally from the point of fixation. The fovea showed a dark cherry spot, and the retina from there to the disc was hazy. The rest of the retina and its vessels were normal. All these appearances gradually faded away, and at the end of a year there was only a slight pallor on the temporal part of the papilla. There was, however, a slight narrowness of the arteries, and there was a white streak along the side of one of the veins. Central vision was about $\frac{20}{200}$. No heart lesion. BURNETT.

XIX.—OPTIC NERVE.

830. WIDMARK. The location of the papillo-macular bundle. *Nordish med. Arkiv*, Jubilee volume, No. 25, 1897.

831. SPICER, W. T. Chronic retrobulbar optic neuritis, with permanent change in nerve, set up by tobacco. *Trans. Ophth. Soc. Un. K.*, xvi., p. 131.

832. WALKER, H. S. Tumor of optic nerve. *Ibid.*, p. 131.

833. OGILVIE, F. M. Optic atrophy in three brothers. *Ibid.*, p. 111.

834. BATTEN, R. D. A family suffering from hereditary optic atrophy. *Ibid.*, p. 125.

835. SPICER, W. T. Spurious optic neuritis. *Ibid.*, p. 134.

WIDMARK's (830) patient was a laborer of fifty-four whose sight had failed two months before, and who had used alcohol and tobacco to excess for years. R V = 0.2; L V = 0.1, with a central scotoma for red, and later a smaller absolute scotoma. Five weeks' hospital treatment brought about no improvement. Three weeks later he fell from the third story of a building, dying with a fractured skull.

Microscopic examination of the nerves and tracts revealed a degeneration of the papillo-macular bundle whose location in the nerve and chiasm corresponded closely to that found in previous investigations. In the tract the bundle first lay upward and inward, but before the tract reached the peduncle the upper part of the bundle turned outward, and lay upward and outward in the tract. The degeneration was especially marked in and immediately in front of the optic canal and gradually decreased as one passed upward or downward. SCHIÖTZ.

SPICER (831) has apparently excluded all causes except tobacco in this case. The only remarkable thing in the history is the

mortality of his children, fourteen of whom died out of twenty. He never completely gave up tobacco. WERNER.

WALKER'S (832) patient, a boy aged eight, noticed proptosis for nine months previous; the eye was displaced forwards and slightly downwards. Vertical movements lost, lateral slight. No *p. l.*, optic neuritis. The tumor was a glio-sarcoma, and was included in the sheath of the nerve. WERNER.

In OGILVIE'S (833) cases vision failed suddenly in one and gradually in two. Ages, twenty-four, twenty-two, and twenty-seven. All temperate smokers. No syphilis. In one case headaches accompanied failure of V., and in another bilious headaches occurred from childhood. Amblyopia equal in both eyes. Optic discs became pale first at outer side. Retinal vessels tortuous. Visual fields contracted, with central scotoma, and color V. defective. A complete family history is given, showing a great mortality in early life. Tortuous retinal vessels were present in nearly all examined. WERNER.

In BATTEN'S (834) cases, the mother's sight began to fail at twelve years of age. Her son, aged twelve, had slight neuritis; a daughter aged ten had distinct atrophy. No evidence of nervous or other diseases. WERNER.

SPICER'S (835) patient, a boy aged eleven and one-half, presented appearances of optic neuritis, with V = $\frac{6}{9}$. No change while under observation during three years. WERNER.

XX.—INJURIES, FOREIGN BODIES (PARASITES).

836. SZILI. Various eye injuries. Demonstration of two cases of magnet operation. *Ung. med. Presse*, 1897, No. 9.

837. SOUS. Pseudo-melanosis of the eye. *Soc. de méd. et de chir. de Bordeaux*, Jan. 1897. *Ann. d'ocul.*, cxvii, p. 137.

838. NATHANSON. On the injurious effect of hairy caterpillars on men and animals, particularly as regards the eyes. *Wratsch*, 1897, No. 8.

839. CLARK, C. F. A question as to the presence and location of a minute fragment of steel in the eye determined by the Roentgen rays. Successful removal by the electro-magnet. *Trans. Amer. Ophth. Soc.*, 1896.

840. FRIDENBERG, PERCY. The localization of foreign bodies in the eye by means of the X-ray. *Med. Record*, May 15, 1897.

841. OLIVER. Clinical notes of a case of injury producing as

the most prominent symptom luxation of the eyeball into the orbit (so-called traumatic enophthalmus). *Ophth. Record*, Jan., 1897.

842. De Schweinitz. A piece of steel in the ciliary body located by means of Roentgen X-rays. *Amer. Journ. of Med. Sciences*, May, 1897.

843. Kollock. Four cases of successful removal of foreign bodies from the eye. *Annals of Ophth.*, Jan., 1897.

844. Stirling, J. W. Tumor of the meninges in the region of the pituitary body pressing on the chiasma. *Ibid.*

Among the patients presented by Szili (836) one was of particular interest. A boy of fourteen was injured by a splinter of copper being driven into his eye by an explosion. Although this foreign body remained there for two years, the eye was not wholly destroyed, but there developed in it a cyst of the iris, in which the bit of copper was enclosed. The cyst was excised and the copper removed. The tension of the eye was somewhat diminished, but projection and light perception were good.

Herrnheiser.

Nathanson's (838) patient was a girl, into whose eye a brown caterpillar had been thrown. On the third day there was marked irritation of the eye and a defect in the corneal epithelium, which healed in a few days. Then small vessels and infiltrations appeared repeatedly in the cornea, lasting each time two or three days, and being accompanied by striped opacities deep in the cornea. Small nodules also appeared in the conjunctiva, lasting for two or three weeks and then passing away, to be followed by the formation of other nodules. The eye regained its original vision. Hirschmann.

Clark (839) reports a case of supposed foreign body in the eye, whose presence and location were determined by means of the skiagraph, and, following these indications, a piece of steel, 1 *mm* square, was removed by means of the electro-magnet from the anterior chamber. It was apparently in the iris.

Burnett.

The method for skiagraphy of the eye for the purpose of detecting the presence and place of a foreign body employed by Fridenberg (840) is to take the views of the eye and orbit at right angles to each other, for the purpose of combination. In one, the closest possible approximation to the eye is effected by

having the two plates bandaged to the eye. The shadows thrown by the bones of the skull are eliminated as much as possible by extreme over-exposure. When two pictures are not possible, the profile picture may be dispensed with and the position of the foreign body computed by the known factors of the diameter of the body itself, that of the shadow picture and the distance of the tube from the plate. BURNETT.

In OLIVER'S (841) case a man of forty-seven was struck by a shuttle on the left eye, five weeks before. When seen he had a retrocession of that eye into the orbit of 4 or 5 *mm* behind its fellow. The pupil was larger than that of its fellow, but the accommodation was good. Palpebral fissure 3 *mm* shorter than on the other side; complete paralysis of sup. rectus and slight paresis of inf. oblique. Vision after correction of H. was $\frac{1}{4}$ of the normal. No fracture of the orbital bones was made out. BURNETT.

The interesting feature about DE SCHWEINITZ'S (842) case, aside from the fact that the piece of metal was located by an X-ray picture made by Dr. Stern, is the fact that after numerous attempts had been made to extract the body (which was not visible) by means of the magnet, it was finally removed by the magnet under the guidance of the picture, and the eyeball saved with vision of $\frac{6}{12}$. The piece of metal was 4 *mm* long, 2 *mm* wide, and weighed $\frac{7}{10}$ grain. The visual feld was somewhat narrowed concentrically. BURNETT.

The first of KOLLOCK'S (843) cases was a bit of steel in the vitreous entering behind the ciliary body. It was successfully extracted by a magnet and perfect vision maintained. The second was a bit of steel in the iris, infringing on the lens. It was removed by a magnet and no permanent injury of the lens followed. The third was a bit of steel embedded in the iris and projecting into the anterior chamber. In making attempts to extract it, it fell into the anterior chamber, from the bottom of which it was successfully removed, though it was full of blood. In the fourth case the foreign body was in the lens, and, some years after its entrance, was removed with the lens, which had become opaque. BURNETT.

STIRLING (844) reports the case of total blindness in the left and complete right hemianopsia of the right eye, in a man of forty-two, coming on slowly. There was atrophy of both sides. Other general symptoms pointed to a lesion near the pituitary body, and on post-mortem examination it was found in the form

of an endothelioma growing from the meninges and pressing on the front of the chiasma. BURNETT.

XXI.—OCULAR AFFECTIONS IN GENERAL DISEASES.

845. WAGENMANN. Remarks on eye affections in gout. *Graefe's Archiv*, xliii., p. 82.

846. GOH. On the eye changes in general septic diseases. Retinitis septica, benign metastatic inflammation, bilateral marantic thrombosis. *Ibid.*, p. 148.

847. JOELSON. On the eye changes in acromegaly. *Wjest. Ophth.*, 1897.

848. STRZEMINSKI. Ocular complications of diseases of the liver. *Rec. d'opht.*, 1897, p. 49.

849. DOLGANOFF. Eye changes following ligation of the gall-bladder. *Arch. f. Augenheilk.*, xxxiv., 3, p. 196.

850. GALEZOWSKI. On ocular scrofula and its relations to hereditary syphilis. *Rec. d'opht.*, 1897, p. 113.

851. STRZEMINSKI. Syphilitic disease of the eye in the second generation. *Gazeta lekarska*, Nov. 23, 1896.

852. DEMICHERI. A case of cerebral syphilis with ocular complications. *Ann. d'ocul.*, cxvii., p. 104.

853. KUDISCH. A case of hemorrhage from the eye of a newborn child. *Südruss. med. Zeitung*, 1896, No. 50.

854. OBERSTEINER. The central visual apparatus in its diagnostic relations. *Wien. med. Presse*, 1897, No. 7.

855. SIEMERLING and BOEDEKER. Chronic progressive ocular-muscle paralysis and progressive paralysis. *Arch. f. Psychiatrie*, xxix., 2.

856. OLIVER. A brief study of the ophthalmic conditions in a case of cerebellar tumor; autopsy. *Trans. Am. Opht. Soc.*, 1896.

857. DE SCHWEINITZ. Histological examination of the eyes from a case of pernicious anæmia. *Ibid.*

858. GRUENING. On mild types of quinine amaurosis without pallor of the optic discs. *N. Y. Eye and Ear Infirmary Reports*, Jan., 1897.

859. DE SCHWEINITZ. Tobacco amblyopia in a woman with anomalous scotomas. *Opht. Record*, March, 1897.

860. HARLAN, HERBERT. A case of amblyopia from a large dose of quin. sulph. *Ibid.*

861. MARLOW. Note on the use and non-use of the occlusive bandage in cases of heterophoria. *Ibid.*

862. WOOD, CASEY A. A case of lead poisoning, presenting some unusual eye symptoms. *Med. News*, May 29, 1897.

863. STEVENS. The clinoscope. *Med. Record*, Feb. 27, 1897.

864. BULL. The ocular complications of typhoid fever. *Ibid.*, April, 1897.

865. BRUNS. Case of quinine amaurosis; observations extending over ten years. *Am. Jour. of Opht.*, Jan., 1897.

866. CULBERTSON. Report of two cases of scopolamine poisoning. *Ibid.*, March, 1897.

WAGENMANN (845) states that gout as a cause of eye disease has received but little attention in Germany. He reports some cases, and speaks of recurrent chalazion, sclerosing keratitis, marginal keratitis, episcleritis periodica fugax, recurrent opacities of the vitreous of hemorrhagic character, and glaucoma, although the last is very rarely caused by gout.

GOH (846) distinguishes septic retinitis from metastatic retinochoroiditis. The former, in which inflammatory signs are wanting, is the expression of a general changed condition of the blood. Toxic matters lead to affections of the blood-vessels. In rarer cases marantic thrombosis in the retina and choroid may be a cause of hemorrhages.

When septic micro-organisms collect in the eye, inflammation always follows, usually of a purulent variety.

JOELSON (847) observed a case of acromegaly in a man of thirty-six. The osseous changes were more marked on the right side than on the left. The ocular conditions were as follows: Exophthalmus R; the lids of both eyes relaxed and œdematous; R pupil enlarged, both pupils respond to light sluggishly; R counts fingers at five feet, L, V = $\frac{20}{40}$. Peripheric vision reduced. R disc pale in the centre, the temporal halves of both discs pale and atrophic. The exophthalmus and the atrophy of the optic nerves were thought to depend upon the thickening of the bone.

HIRSCHMANN.

STRZEMINSKI (848) collects the cases that have been reported of eye affections due to diseases of the liver, and adds the following observations:

1. Optic neuritis with concentric contraction of the field in cirrhosis of the liver. The patient was a laborer of forty-four, addicted to the use of alcohol.

2. Hemeralopia and œdema of the discs during a catarrhal icterus. The ocular disturbances ceased when the hepatic affection was cured. The patient was a woman of twenty-three.

3. Marked hyphæmia in a laborer of twenty who suffered from hypertrophic cirrhosis of the liver. SULZER.

STRZEMINSKI (851) treated two children whose parents had not suffered from acquired syphilis, but whose father, at the age of sixteen, had bilateral parenchymatous keratitis, and now shows areolar choroiditis. One child, a boy of twelve, had a bilateral parenchymatous keratitis, followed by areolar choroiditis and opacity of the vitreous. The other child, a girl of nine, lost the sight entirely from opacity of the vitreous, which cleared up under mercurial treatment when a pigmentary choroiditis, similar to retinitis pigmentosa, was discovered. HIRSCHMANN.

KUDISCH'S (853) patient was delivered prematurely from a mother suspected of having syphilis, and Crede's nitrate of silver solution had been instilled into the eyes. The following day there was a discharge of blood, without pus, from the conjunctiva of the eyes, which were otherwise healthy. Treatment with bandages, cold applications, etc., was of no avail. On the fourth day an eruption appeared on the body, the soles, and the palms, supposed to be syphilitic. The frenulum of the tongue was cut, as the movements of the tongue were restricted. This operation was followed by an uncontrollable hemorrhage, which caused death on the seventh day. The author regards this as a case of hemorrhagic hereditary syphilis. HIRSCHMANN.

OBERSTEINER (854), in his paper, gives a condensed description of the portions of the brain concerned in vision, and of their functions. He regards the retina and optic nerve, not as a peripheral sense organ, but as a central one, since section of the optic nerve is not followed by recovery, as in the case of peripheral nerves. He speaks then of the anatomical course of the visual apparatus in the chiasm, tract, etc., and places the cortical visual apparatus in the calcarine fissure of the occipital lobe. The physiological conception of this region, that the optical memory images lie in the cortical cells in the region of the visual centre, is not adopted by Obersteiner; other reasons apart, cases have been observed in which both occipital lobes were destroyed,

while the perception of visual images remained. As to the function of the visual sphere, the author does not agree with those who assume the existence of separate regions for the perception of light, color, and form. Color- and light-sense perception are located at the same point, while the conception of form is a more complex psychical process, which in Sachs's opinion arises from the representation of motion through the innervation of the ocular muscles.

In speaking of the pathological changes in the visual tract, he dwells on bilateral cortical hemianopsia, in which central vision is preserved, showing that some small region has escaped destruction. In bilateral destruction of the occipital lobe, the patient loses also the faculty of orientation. This also occurs with unilateral disease, so that the author believes that with the destruction of this part are also affected the association fibres running to other regions.

OLIVER'S (856) case was a man of thirty-eight, who had the usual symptoms of brain tumor, with choked discs. The peculiarities of the ocular symptoms were the high degree of neuritis; almost absolute blindness in the right, with a small, oblong, central remnant in the left. Nearly total interior ophthalmoplegia, most marked on the right side, and horizontal nystagmatic movements. All these, he thinks, indicate more precisely the origin of the growth, which was from the under and external surface of the middle cerebellar peduncle, projecting outwardly between the pons, medulla, and right cerebellar lobe. BURNETT.

The histological characteristics found by DE SCHWEINITZ (857) post mortem, in a case of pernicious anæmia were, as to the eyes: (1) hemorrhages into the various strata of the retina, but most marked in the nerve-fibre layer; (2) varicose hypertrophy of the fibres of the optic-fibre layer, either as an isolated lesion or gathered in a conglomorate mass; (3) exquisite œdema of the retina, especially marked at the periphery, beginning in the outer reticular layer and gradually involving the outer granular layer, and converting the space between the internal granular layer and outer limiting membrane into a series of oval cavities.

BURNETT.

GRUENING (858) here reports two cases of mild quinine amaurosis with typical contraction of the visual fields, not attended with pallor of the optic discs as is usually the case, but, on the contrary, with a rather over-full condition of the vessels.

In these cases, central vision was but little reduced. One was a woman of fifty, the other a man of seventy-three.

BURNETT.

DE SCHWEINITZ'S (859) case was a woman of sixty, who had characteristic tobacco amblyopia, with central scotoma for green and red—beginning 5° to the temporal side of the fixing point, and passing to 20° on the horizontal and 15° above and below at the base of this triangular spot. There was no reason to suppose that *alcohol* played any part in the intoxication. She smoked probably more than six cigars a day. Vision in left has always been defective. Under strychnia and iodide of potassium and stoppage of tobacco, a perfect recovery was obtained for the right eye. BURNETT.

In HARLAN'S (860) case a man took 200 grains of quinine sulph. Some 4 days after, the patient was totally blind. Pupils widely dilated, nerves white, and retinal vessels reduced to the merest threads. Under strychnia he improved so that V in R $\frac{1}{20}$ L $\frac{1}{4}$, but only for a very limited field, which however gradually widened to 35° or 40° laterally from the point of fixation and 20° to 25° vertically. BURNETT.

MARLOW (861) recommends the use of an occlusion bandage on one eye as a good means of developing any latent heterophoria, but condemns the bandage after operation on the muscles. The operated eye being free and able to participate in binocular vision goes far to securing a proper place of re-union of tendon to the ball. BURNETT.

The unusual features about WOOD'S (862) case of lead poisoning is the unilateral (left) paralysis of the third nerve, and a slight papillitis of both nerves with contraction (concentric) of both fields. There were no other symptoms of lead poisoning present at that time, though the man had bad attacks of colic previously, and had been a painter for sixteen years.

BURNETT.

STEVENS (863) describes an instrument for the purpose of testing the declination of the vertical meridians of the retina. It consists of two parallel tubes so arranged that they can be rotated on the horizontal axis or raised or depressed separately. At the distal ends are inserted the figures which serve as test objects, viewed from the proximal end, for the determination of the extent of such declination, and the amount of such variation can be read off on a scale fixed on the outside of the tubes. BURNETT.

BULL (864) enumerates the diseases of the eye which are liable to be met with in typhoid fever in the following order of frequency: Conjunctivitis. Phlyctenular conjunctivitis and keratitis. Loss of accommodation and dilatation. Retinal hemorrhages. Paralysis of external muscles. Neuro-retinitis, or retro-bulbar neuritis. Inflammation of the uveal tract. BURNETT.

The principal feature of interest in the case of quinine amaurosis reported by BRUNS (865) is the condition ten years after the occurrence. The nerves are blanched bluish-white, and vessels very tenuous, and yet in a good light V = $\frac{20}{40}$, and No. 1 can be read. V F F. not narrowed so much as to cause any inconvenience. They were not taken accurately. Color perception for red and green good. BURNETT.

CULBERTSON (866) reports two cases of toxic effects from scopolamine drops of a strength of one fourth of one per cent. Two drops put in in the course of an hour in one, eight drops during the same time in another, produced this effect. BURNETT.

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Beginning with the issues for 1898, THE ARCHIVES OF OPHTHALMOLOGY and THE ARCHIVES OF OTOLOGY will be published in bi-monthly numbers instead of in quarterly numbers as heretofore. The numbers of the Ophthalmology will bear date January, March, May, July, September, November, and the numbers of Otology will bear date February, April, June, August, October, December. The annual volumes will be issued in the same form and at the same price as heretofore, namely, $5.00 for Ophthalmology and $4.00 for Otology.

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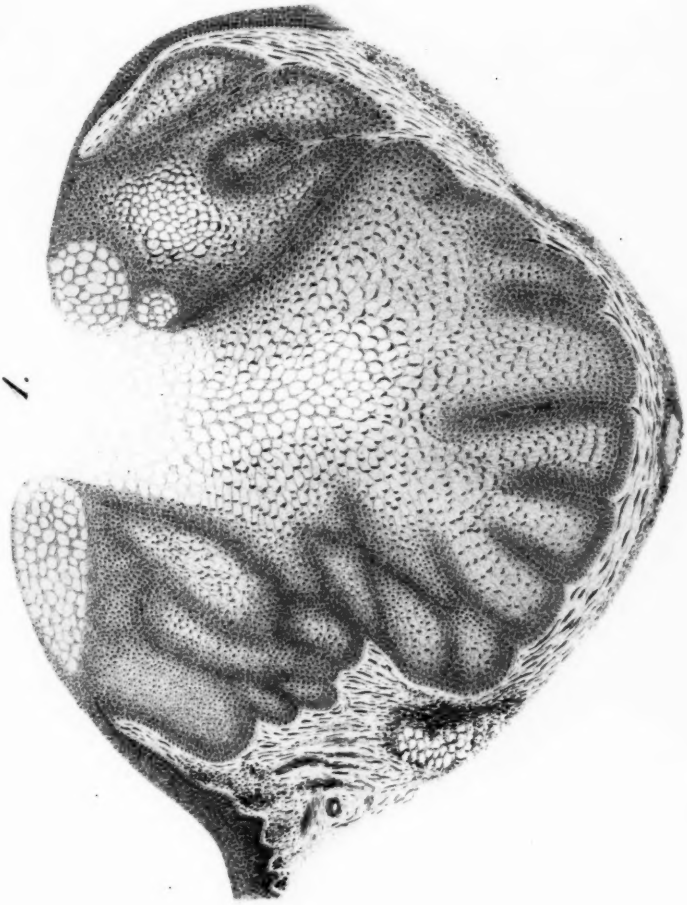

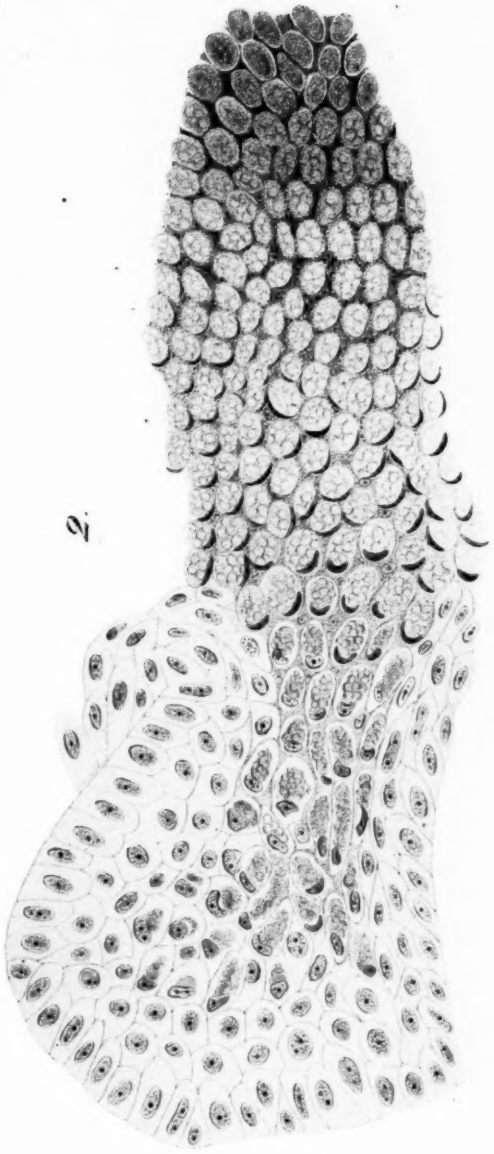
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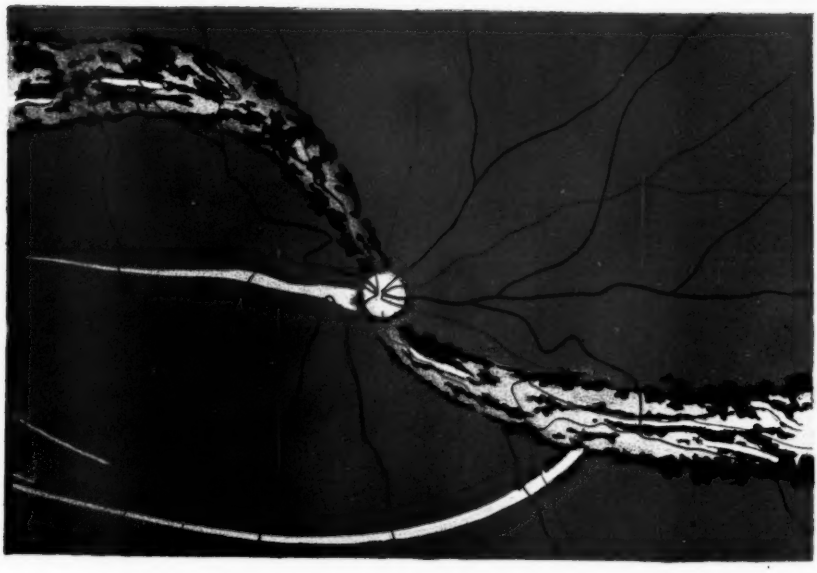

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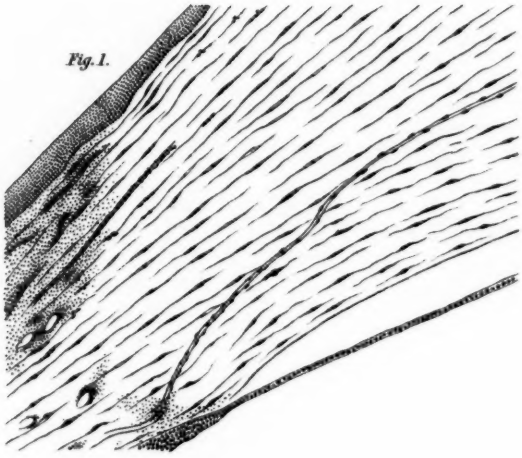

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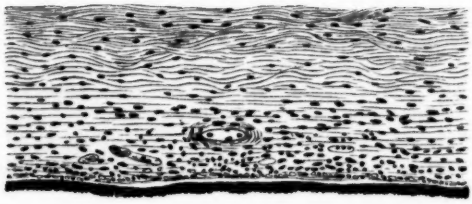

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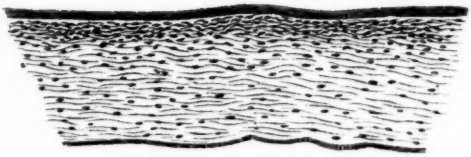

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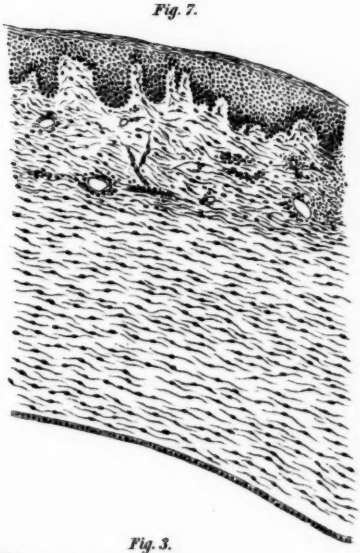

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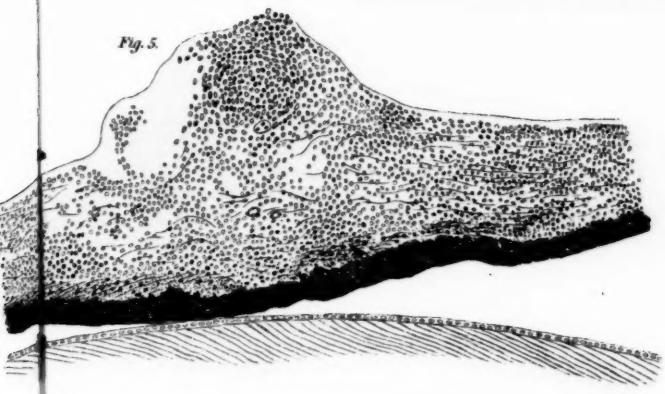

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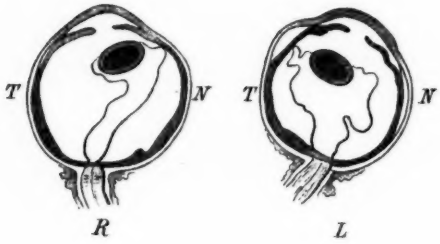

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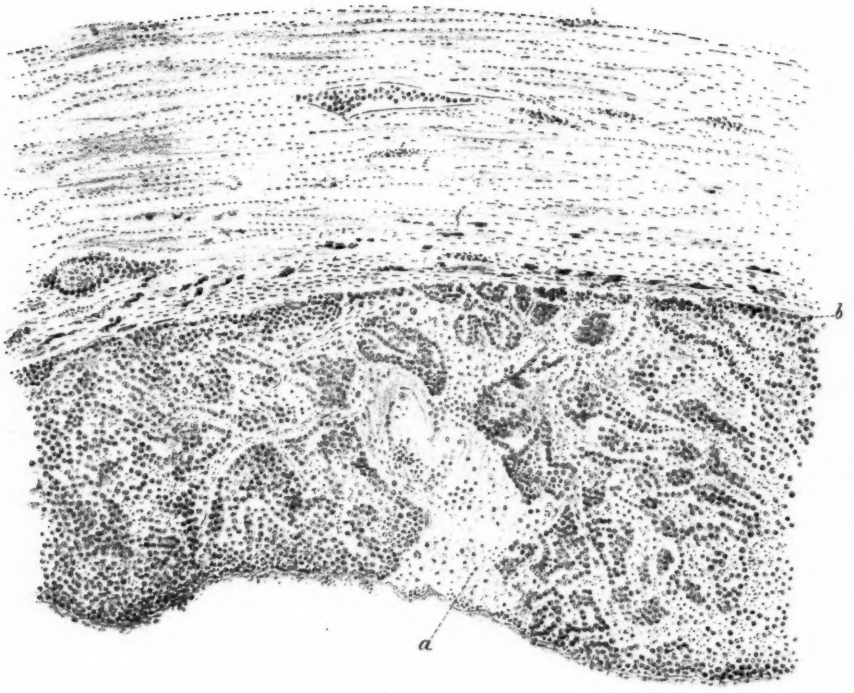

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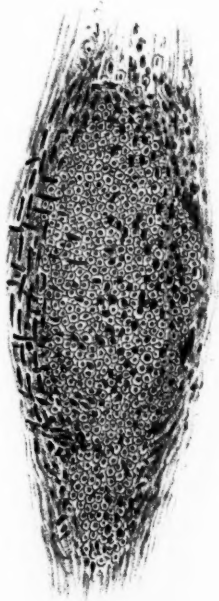

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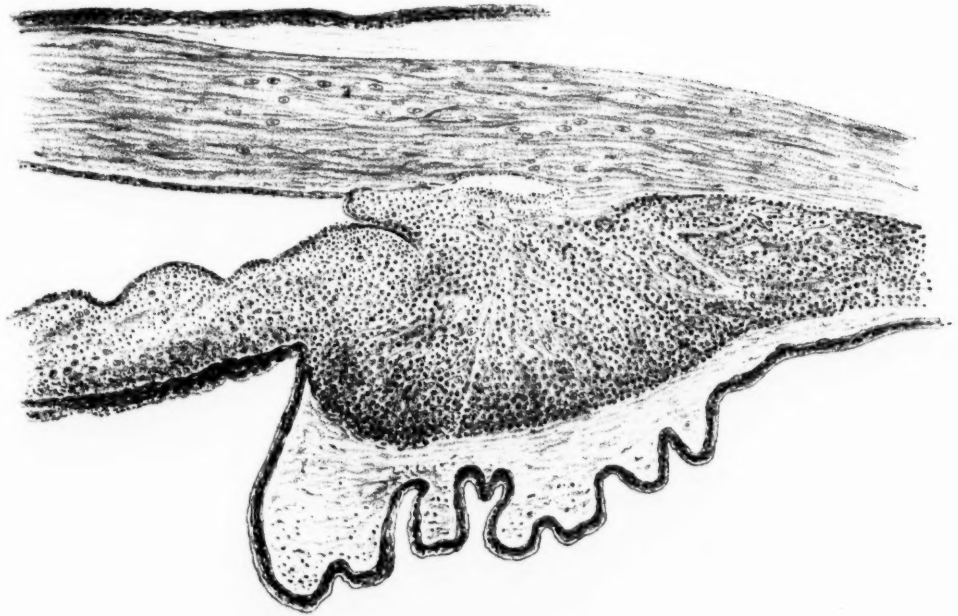

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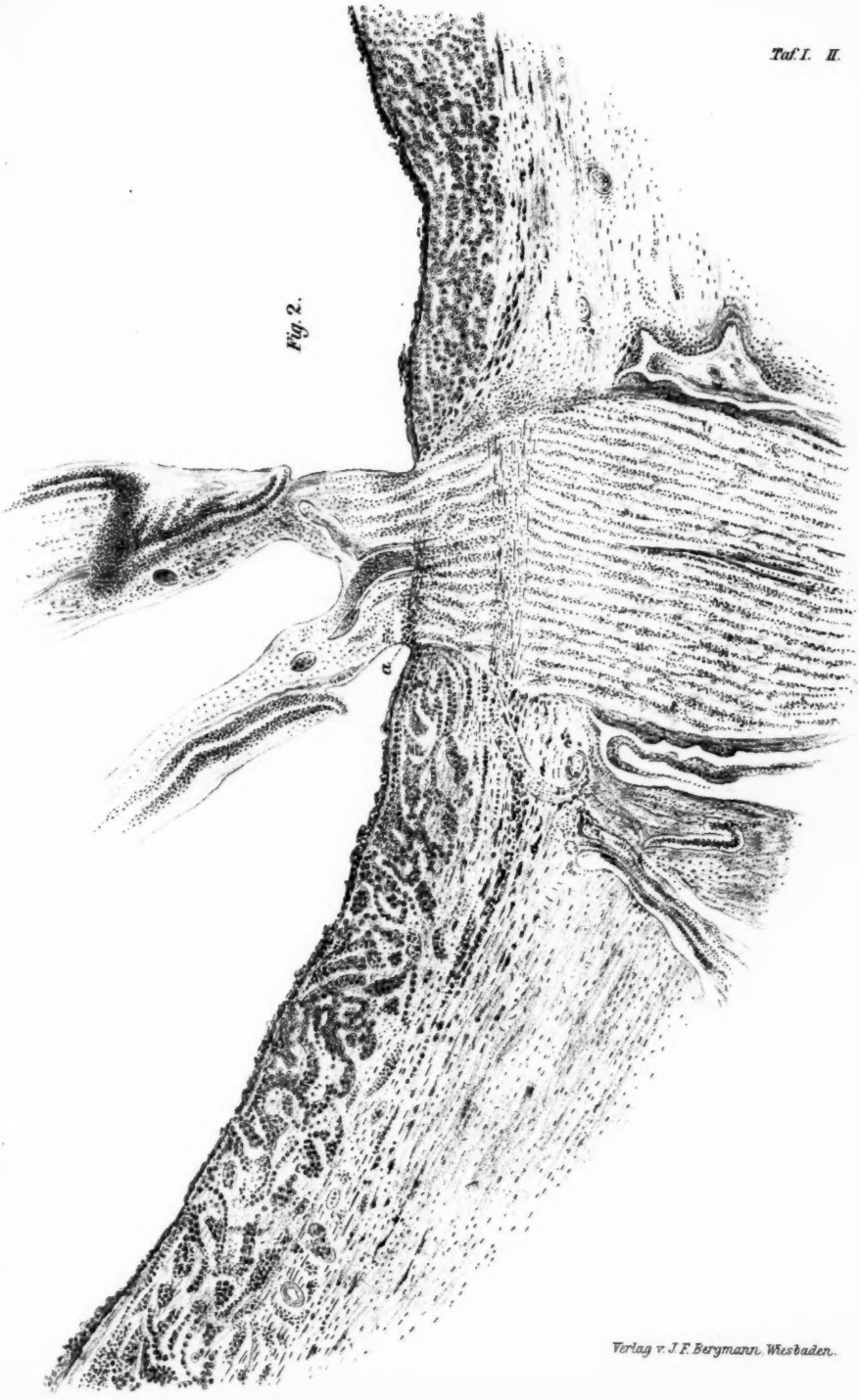

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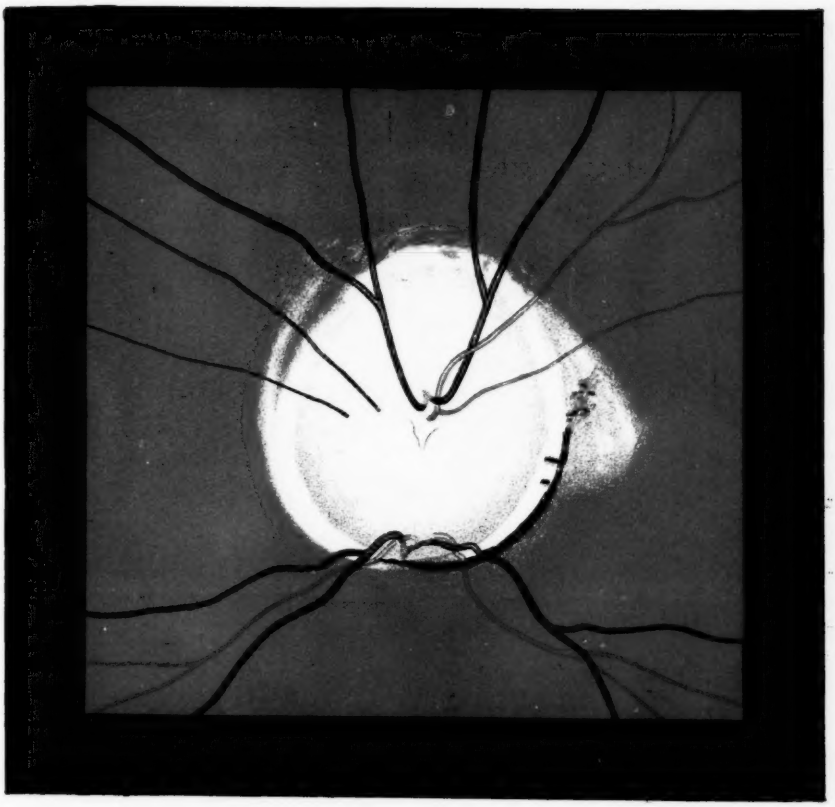

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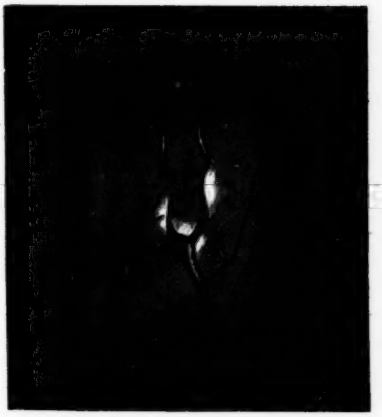

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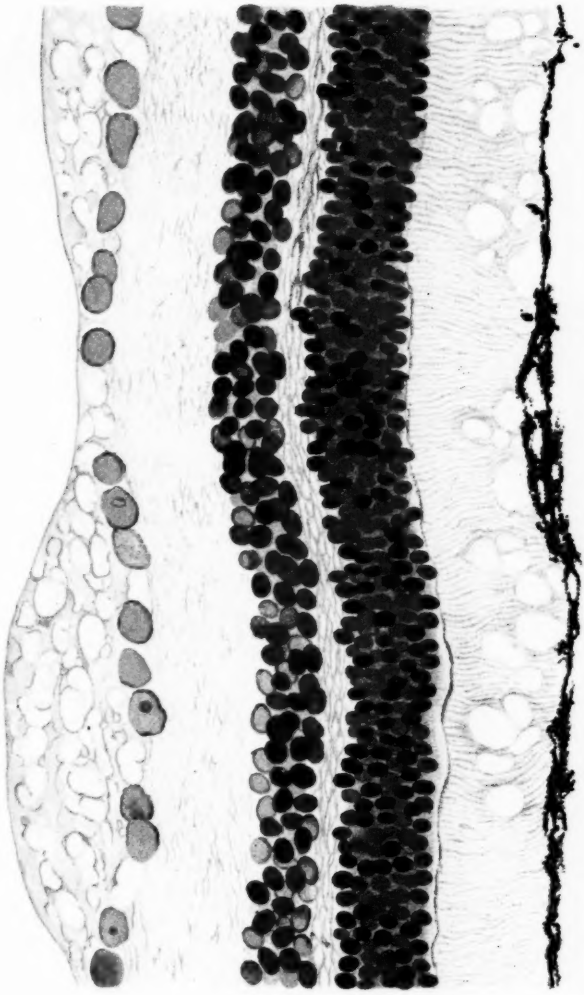

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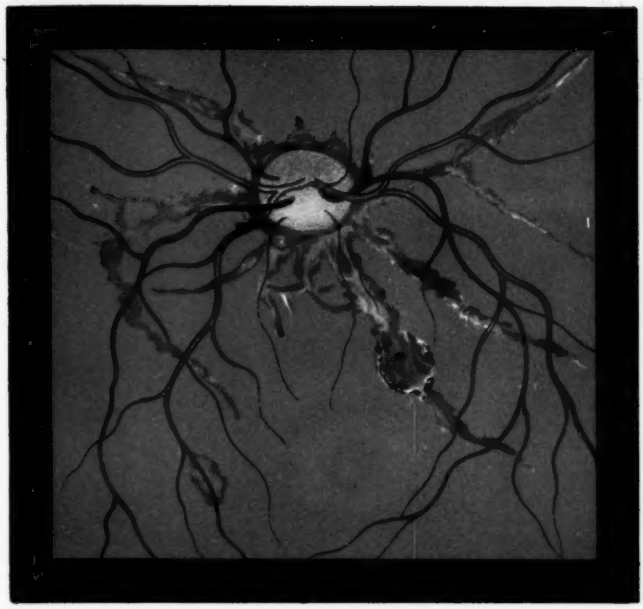

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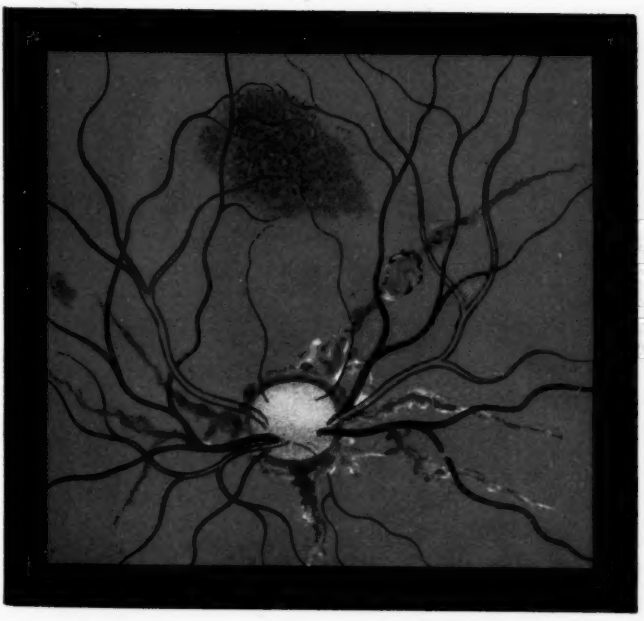

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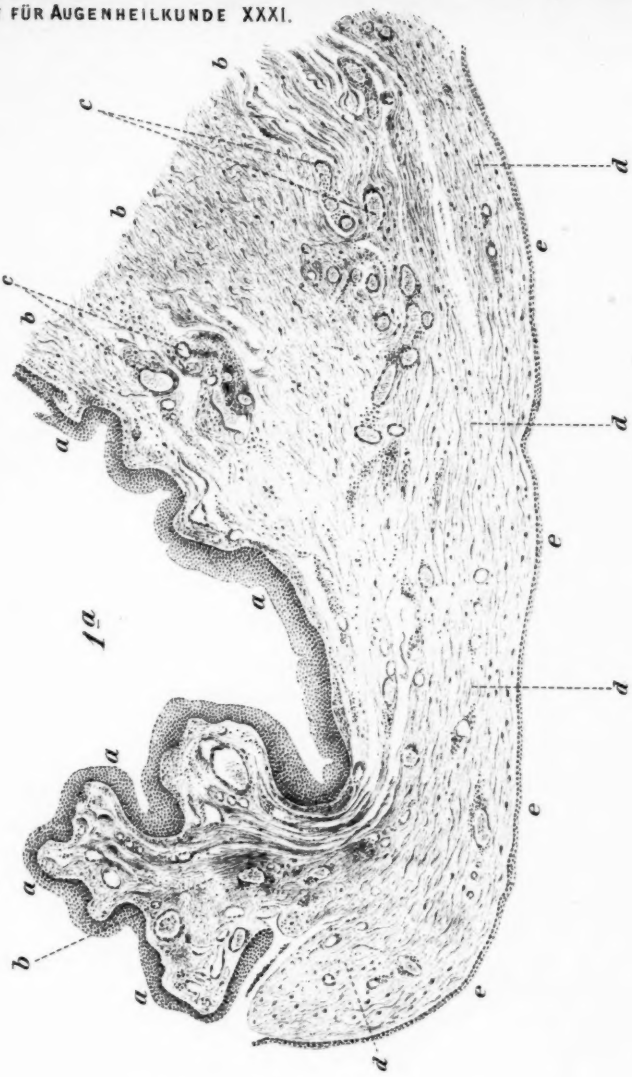

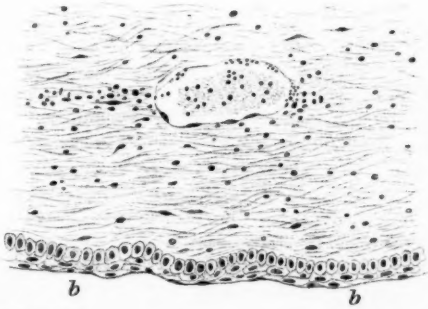

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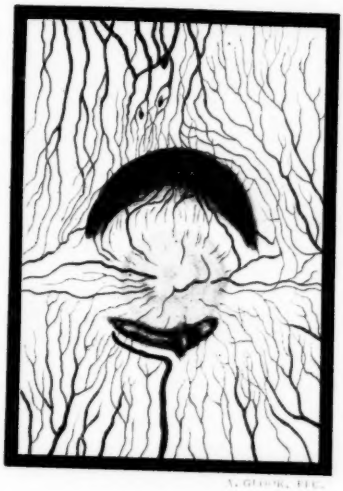

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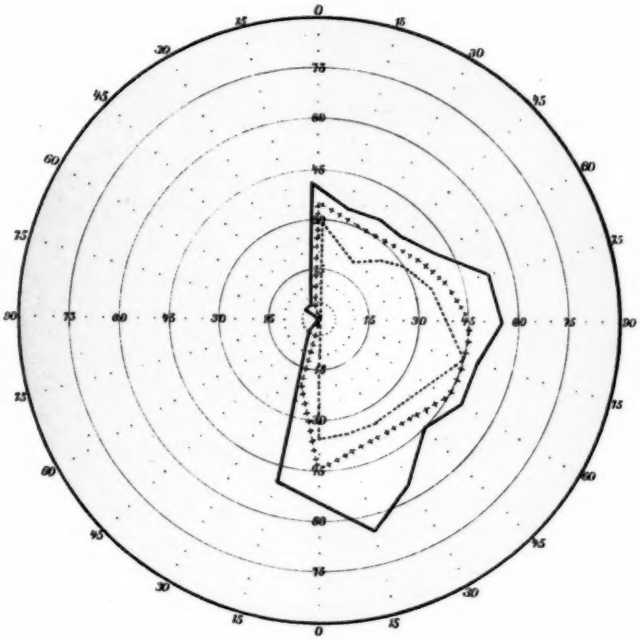

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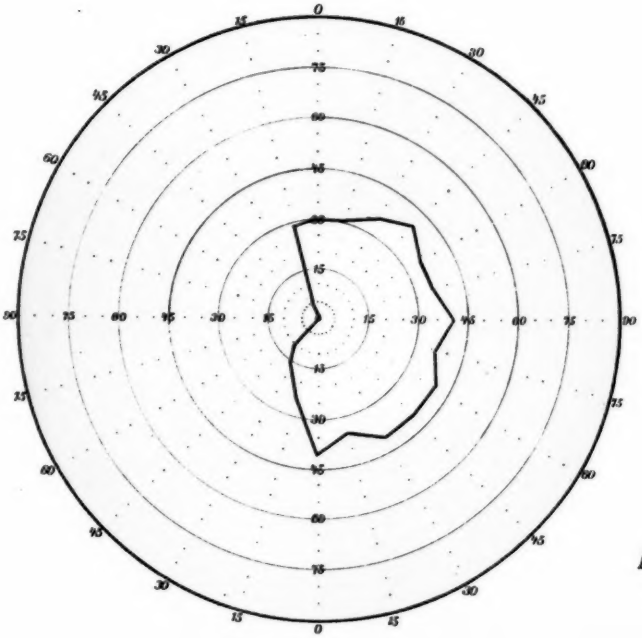

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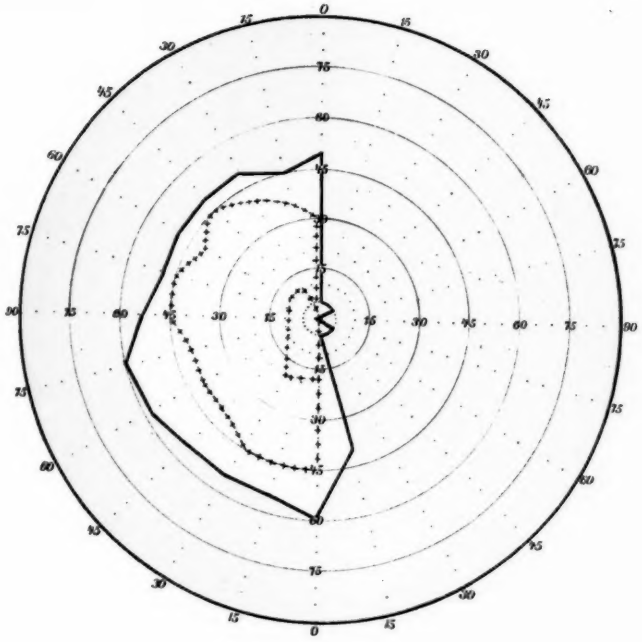

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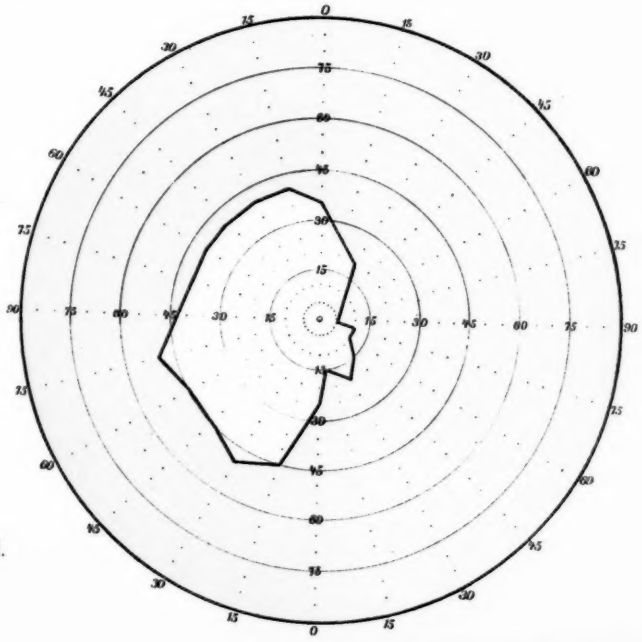

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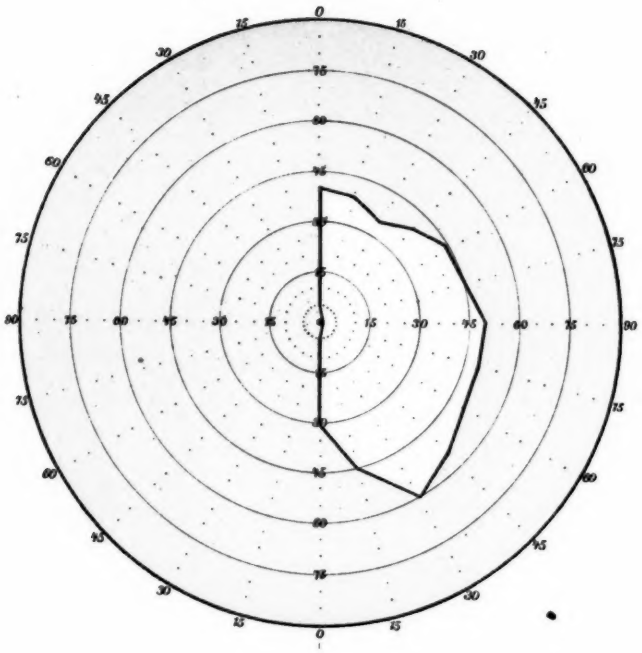

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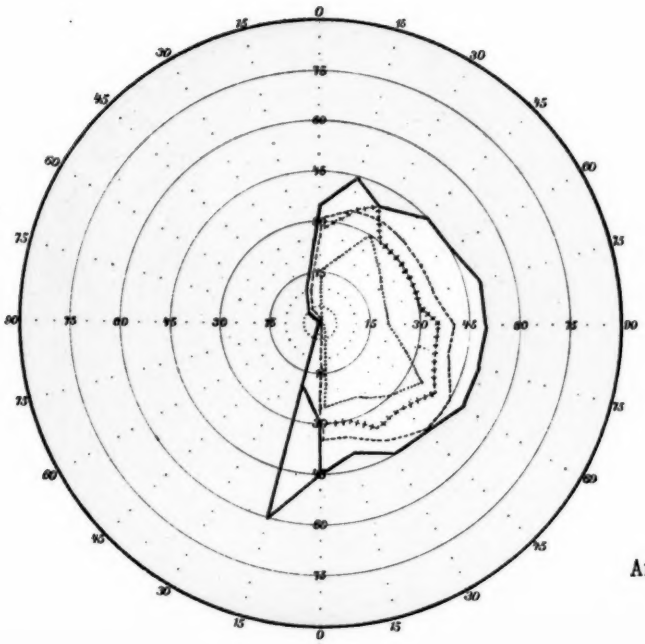

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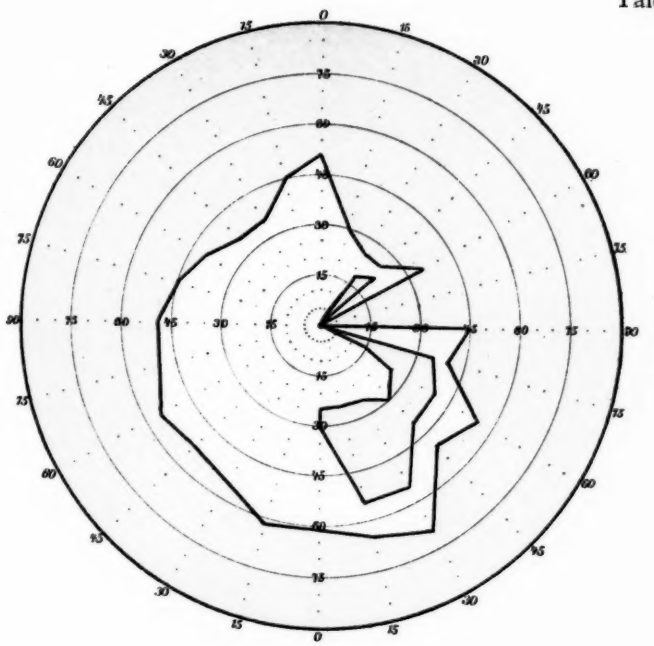

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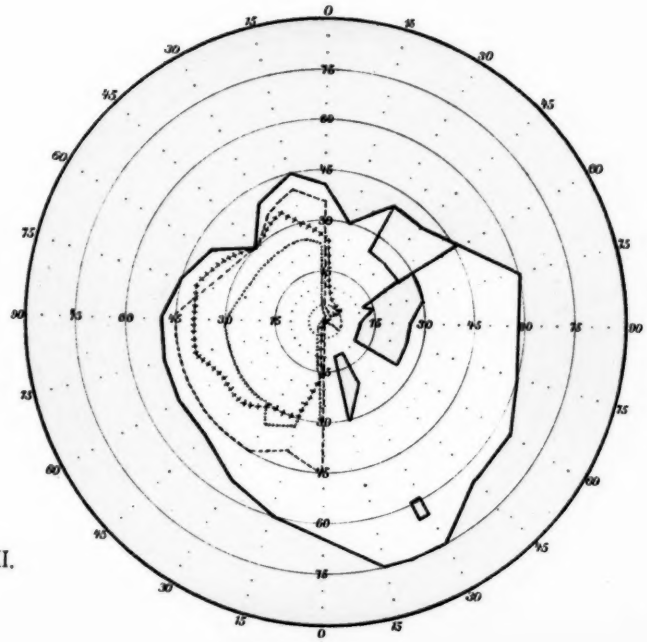

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Dr. Gutmann's Paper.

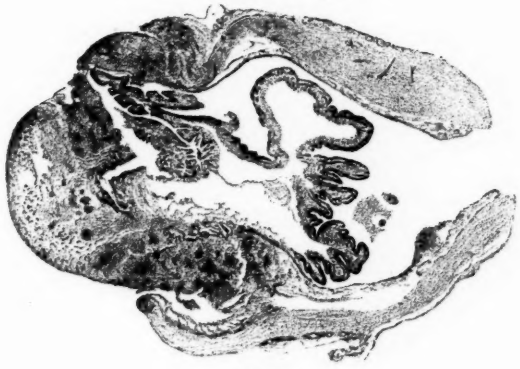

FIG. 1.

FIG. 2.

FIG. 3.

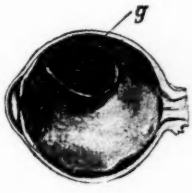

FIG. 4.

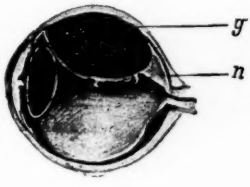

FIG. 5.

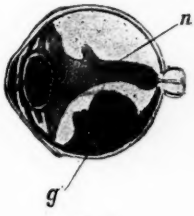

FIG. 6.

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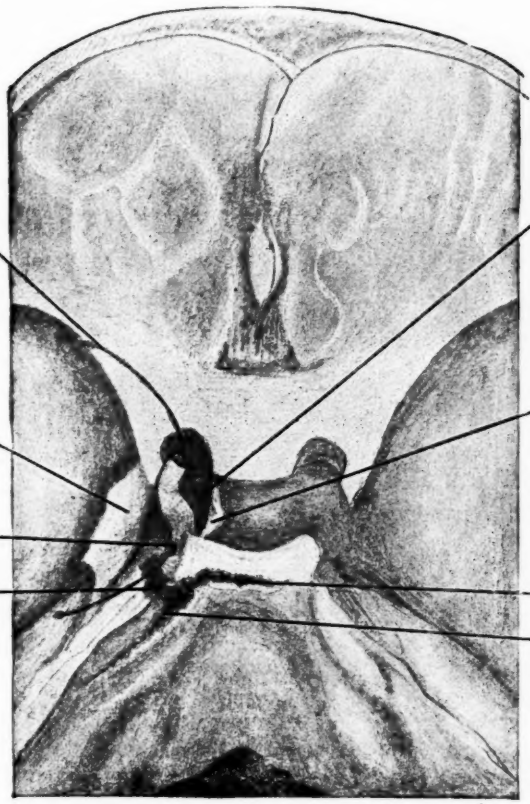
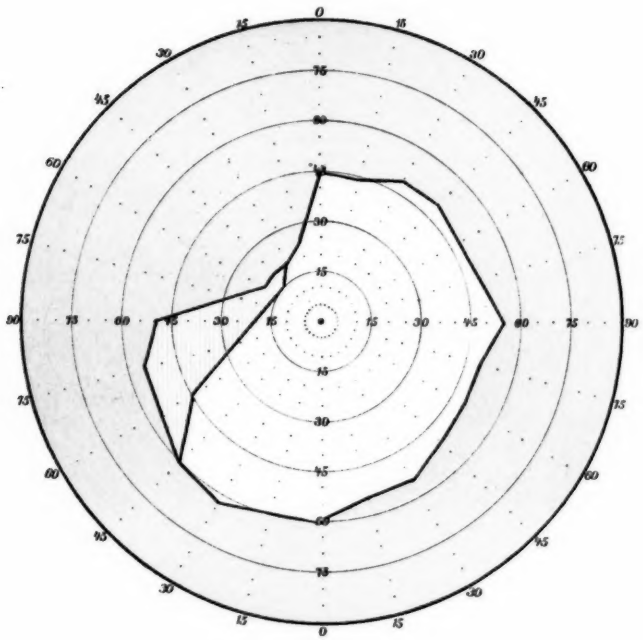

Sound passed through the rupture into the internal carotid.
Lateral wall of the cavernous sinus.
Break in the internal carotid.
Thrombus in the posterior portion of the cavernous sinus.
Dilated anterior portion of the cavernous sinus (not thrombosed).
Medial wall of cavernous sinus.
Thrombus in the intercavernous sinus.
Thrombus in inferior petrosal sinus.

1.



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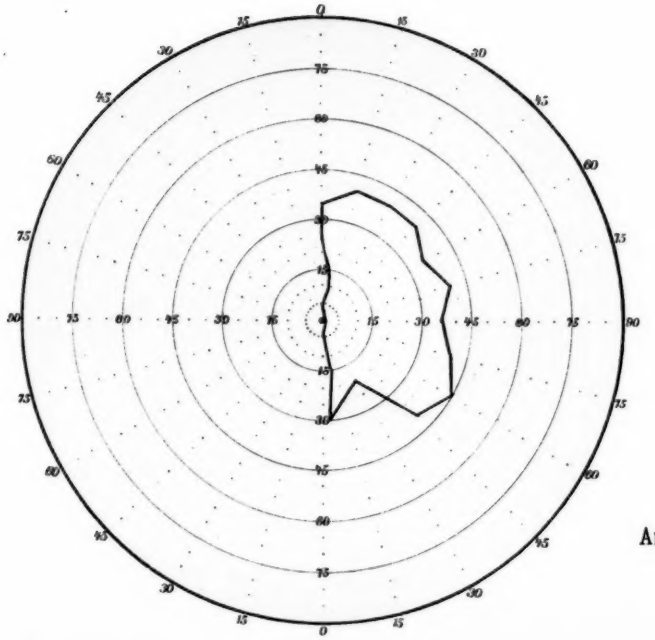

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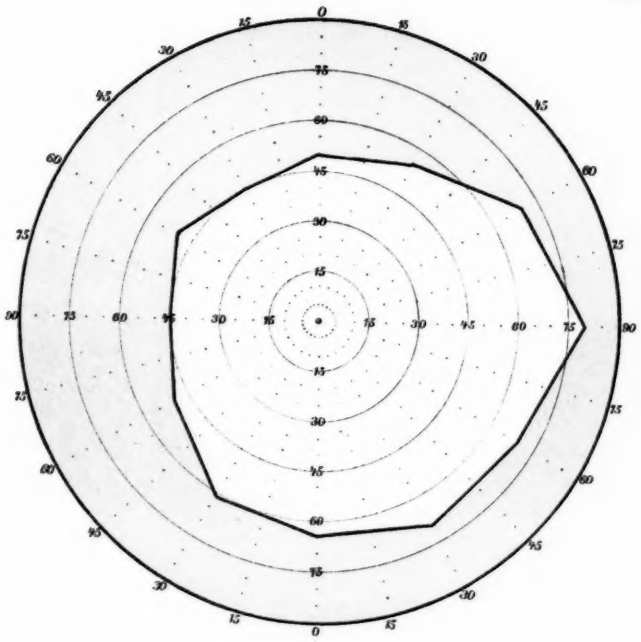

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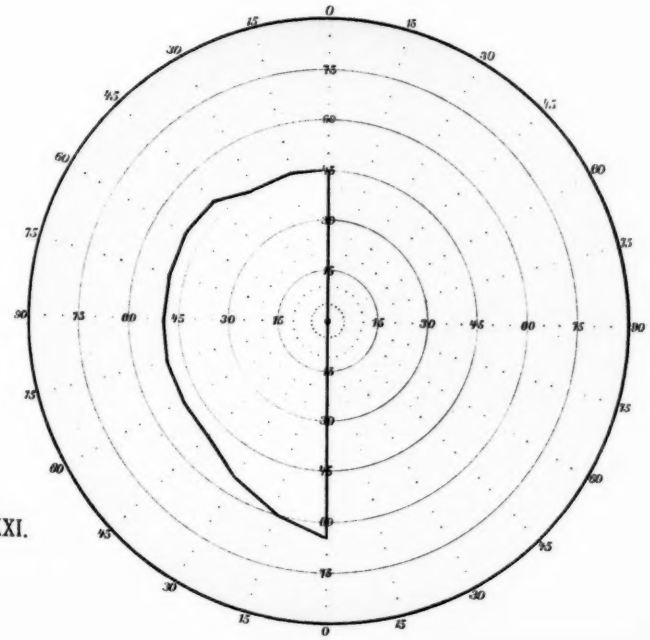

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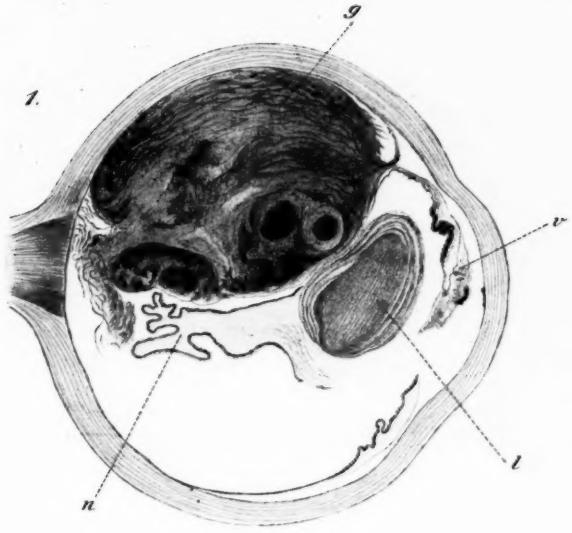

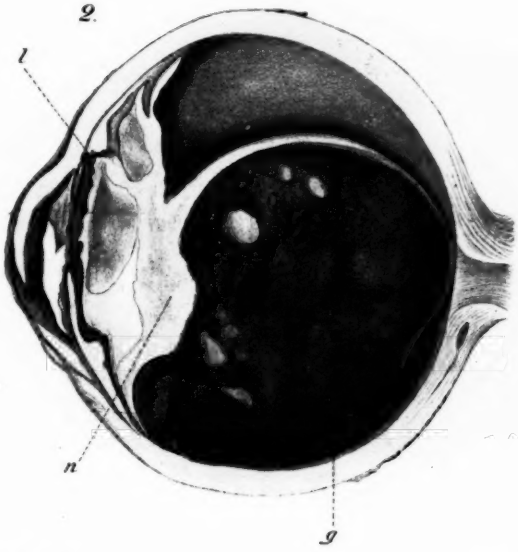

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AND
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ASSISTANT EDITOR

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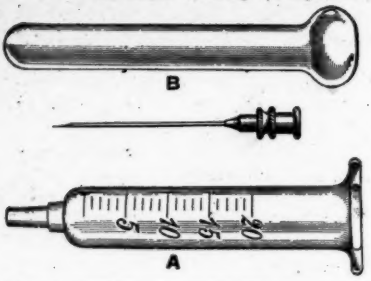

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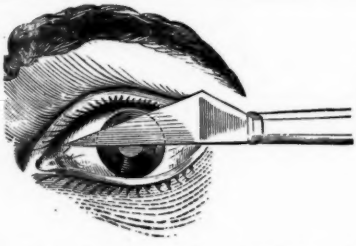

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